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OF

PRACTICAL MEDICINE

COMPRISED IN

A SERIES OF ORIGINAL DISSERTATIONS.

ARRANGED AND EDITED BY

ALEXANDER TWEEDIE, M.D. F.R.S.

FELLOW OF THE ROYAL COLLEGE OF PHYSICIANS,
PHYSICIAN TO THE LONDON FEVER HOSPITAL AND TO THE
FOUNDLING HOSPITAL, ETC.

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LIST OF THE AUTHORS

OF THE DISSERTATIONS ON PRACTICAL MEDICINE.

W. P. ALISON, M.D. F.R.S.E.
Professor of the Institution of Medicine in the University of Edinburgh.

JOHN HUGHES BENNETT, M.D.

GEORGE BUDD, M.D. F.R.S.
Professor of the Practice of Medicine, King's College, London, &c.

WILLIAM BUDD, M.D.

GEORGE BURROWS, M.D.
Assistant Physician and Lecturer on the Practice of Medicine at St. Bartholomew's Hospital, &c.

ROBERT CHRISTISON, M.D. SEC. R.S.E.
Professor of Materia Medica in the University of Edinburgh, &c.; President of the Royal College of Physicians, &c.

W. B. CARPENTER, M.D.
Lecturer on Forensic Medicine in the Bristol Medical School, &c.

ROBERT FERGUSON, M.D.
Professor of Midwifery, King's College, London; Physician to the Westminster Lying-in Hospital, &c.

GEORGE GREGORY, M.D.
Physician to the Small Pox and Vaccination Hospital, &c.

JAMES HOPE, M.D. F.R.S.
Physician to St. George's Hospital, &c.

WILLIAM BRUCE JOY, M.D.
Fellow of the King's and Queen's College of Physicians in Ireland; Physician to the Dublin General Dispensary, &c.

CHARLES LOCOCK, M.D.
Consulting Physician to the Westminster Lying-in Hospital, &c.

J. C. PRICHARD, M.D. F.R.S. M.R.I.A.
Corresponding Member of the National Institute of France; Senior Physician to the Bristol Infirmary, &c.

RICHARD ROWLAND, M.D.
Physician to the City Dispensary, &c.

H. E. SCHEDEL, M.D.
Paris.

THOMAS SHAPTER, M.D.
Physician to the Exeter Dispensary, &c.

J. A. SYMONDS, M.D.
Physician to the Bristol General Hospital; Lecturer on the Practice of Medicine at the Bristol Medical School, &c.

ROBERT H. TAYLOR, M.D.
Liverpool.

THEOPHILUS THOMSON, M.D.
Physician to the Northern Dispensary, &c.

WILLIAM THOMSON, M.D.
Fellow of the Royal College of Physicians and Surgeons, Edinburgh; Physician to the Royal Dispensary, &c.

THOMAS WATSON, M.D.
Physician to the Middlesex Hospital, &c.

C. J. B. WILLIAMS, M.D. F.R.S.
Professor of the Practice of Medicine, University College, London.

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The design of the following introduction is to facilitate the study of diseases, by exhibiting to the reader a brief view of the more simple forms of morbid action, before leading him to the investigation of those complex phenomena which are the subjects of nosology. From the want of some pathological rudiments, the student of medicine is often at first unable to comprehend the simplest nosological descriptions; for, at the very onset, he may have to encounter such terms as *congestion*, *inflammation*, *tubercle*, *scirrhus*, *hypertrophy*, *plethora*, *anæmia*, *spasm*, *nervous irritation*, &c. &c. If such words could be interpreted at once by reference to a technical dictionary, the difficulty would be trifling; but every one of these (and many more might be enumerated) requires, before it can be rightly understood, not a mere verbal explanation, but a discussion scarcely less extended, and sometimes even more so, than the disease in the account of which the word occurs. We trust that the following pages, although not intended to present a full dissertation on general pathology, may explain sufficiently the nature of disease in the abstract, as well as the leading principles which determine the association and succession of morbid actions; and likewise, that they will be found to contain such an exposition of the elements, or (to speak strictly) the *proximate principles* of disease, as will enable the reader to comprehend more readily the subsequent parts of this work, illustrative of the nature and treatment of special diseases.

Disease, in its most comprehensive signification, may be defined to be an abnormal condition of, or a deranged action in, the whole, or a part, of a living system. It includes, therefore, every unusual change in the physical qualities of the organs and tissues, as in colour, consistence, form, volume, &c.; every unusual distribution of the fluids, or alteration of their properties; and every disordered movement or sensation. But we shall find that disease is also used in a more limited acceptation, denoting either a col-

lection of disordered actions, called symptoms, or some one of a series of actions which bears the relation of cause to the others.

Disease may be a mere excess or deficiency of action; but not less frequently it is faulty in kind as well as in degree. Thus, pain is not a plus or minus state, but a derangement of sensation; tuberculous formations consist in a perversion of, rather than in too much or too little, secretion; and diabetic urine is depraved in quality, as well as inordinate in quantity.

Disease is not an absolute state or action; it must obviously bear a direct relation to the nature of the part of which it is predicated; and to the disposition of the whole system. What would be natural action in one organ or tissue, would be morbid in another. For example, the capillary congestion, which is healthy in mucous tissue, would constitute intense disorder in a serous membrane. The *age* of the subject often gives the character to the action. Thus, a secretion of mucus in the stomach of an adult to the same amount as is known to be normal in the infant, would indicate disease in the former. The liver at the time of birth is developed to such an extent, that a proportionate volume in after years would be considered enormous hypertrophy of this organ.

Temperament will also determine the existence of disease. The sudden exhibition of great vivacity in a melancholy person would intimate disturbance of the brain, though it might awaken no apprehension whatever if observed in one of the sanguine temperament. Idiosyncrasy, or the peculiarity of individual constitution, must also be viewed in connection with the supposed disease. Thus, intermittent pulsation of the heart in two individuals would be viewed very differently with respect to disease, if it were known to be congenital in one of them.

The variability of the standard of disease may be farther illustrated by observing how the same structures and actions vary in different species. The dilatation of an artery which in the human subject would be considered aneurism, is normal in some of the *Cetacea*. The air-cells in the lungs of turtles have naturally a development, which in man would be emphysematous; and again, the normal thickness of the parietes of the heart in birds, and of the stomach in horses, represents what is known as hypertrophy in the human organism. In some of the *Carnivora*, and in birds of prey, the condition of the blood and the secretions, together with the action of the heart, and that of the respiratory organs, present a group of symptoms not very unlike what physicians designate inflammatory fever.

Disease is often distinguished as structural or functional. Thus, hypertrophy of the heart is a structural disease, but mere palpitation is functional. Some have maintained that all diseases must be structural, because the deranged action of an organ implies a fault in the machinery. But, without insisting on such objections to this view as might be grounded on the fact, that the action of a machine may be disturbed by a disproportionate exertion of the impelling power, independently of any fault in its works, we content ourselves with remarking, that disease of the structure itself must have been preceded by disordered action; that is, disordered nutrition of the part. The terms in question, however, are applied principally to the affections of special organs, rather than of their constituent tissues; and it must be allowed that there are very few instances in which the action of the organ is deranged, without alteration in some of its parts. The organ, strictly speaking, consists not only of the solid structure, but also of the fluid, which traverses it; and therefore any abnormal quantity or condition of this fluid comes properly under the denomination of organic disease.

Morbid actions or phenomena may occur singly; but far more frequently they are observed in certain groups. The latter are what are generally known as special diseases, and are the subjects of nosology. The individual affections composing the groups are called *symptoms*, or *coincidents*, which are themselves instances of disease. Thus the disease called phthisis is a collection of morbid states, such as emaciation, hectic fever, cough, expectoration, &c.; these are its symptoms: none of them individually could be called phthisis — a name which only belongs to them collectively. The study of morbid actions as to their association is highly important, but it is still more requisite to consider them in certain series, or as the necessary consequences of some other derangement, which is called the proximate cause. This is often spoken of as *the disease par excellence*, in contradistinction to the symptoms, which are merely its effects. We shall endeavour to trace some of the circumstances to which diseased actions owe their association and succession: —

1. The first of these is the direct mutual dependence of certain actions upon each other, so that when one is impaired or obstructed, the rest, whether prior or subsequent to it, must be necessarily affected. This principle is strikingly illustrated by contraction of the orifice of the aorta. The imeddiment offered to the exit of blood from the left ventricle must soon be felt in the pulmonary circulation, the obstruction of which will occasion difficulty of breathing, cough, and perhaps hæmorrhage into the air-cells, or effusion of serum into the tissue of the lungs; or a state bordering upon inflammation of the bronchial membrane; and this again will obstruct the circulation in the right side of the heart, the effects of which may be coextensive with the venous circulation, and consequently with the function of the capillaries throughout the body. And while such a host of evils may in this manner result from the primary lesion, scarcely fewer might be traced to the defective supply of blood in the arteries. This instance is one of the most forcible that could have been selected, because it involves a function of universal importance to the system. But the same connection of dependence between diseased actions may be observed on a much more limited scale, as in the constipation produced by want of the usual stimulus of the bile.

2. Another class of morbid actions, observed frequently to concur or to supervene upon each other, are derangements of functions allied for some common purpose. There is no mutual dependence between the action of the diaphragm, and that of the intercostal muscles, but they are often disordered at the same time from the operation of a cause common to both; for instance, the irritation of the bronchial membrane communicated to the medulla oblongata, and reflected along the motor nerves to the muscles of respiration. The frequent coincidence of anorexia, nausea, and vomiting, with derangement of the liver; of spasm of the muscles employed in evacuating the bladder and rectum, with irritation of the mucous linings of these organs; of disease of the mamma with that of the ovaries and uterus; illustrate the same principle. This consent of action is often called Sympathy — a term which, if used as extensively as its etymology warrants, might be applied to any coexistent disorders, even those which are necessarily consequent upon each other, or those just spoken of as ensuing upon some lesion common to them all. But it is better to restrict the term, at least in its pathological import, to certain actions, of which we shall speak directly.

3. A third class are those disordered actions which are connected by the continuity of structure. A simultaneous affection of different portions

of the skin does not exemplify this group, because, although they are parts of a continuous tissue, they may owe their derangement to some circumstance which operates at the same time upon the whole surface; as, for instance, a diseased condition of the blood. But the influence of continuity is seen when the morbific agent is strictly local. Thus erysipelas, or inflammation of the skin, may extend from a point wounded by a thorn over an entire limb. The skin being disposed to disease from slight causes, the part inflamed by the action of the thorn becomes a cause of irritation to the adjoining portion; whether by the pressure of the distended capillaries, or by the increase of the temperature, or by disturbed nervous action, is not known; but the mischief may extend indefinitely, or be stopped when it has reached a part of the cutaneous tissue less susceptible of provocation. In mucous membranes the same phenomena are often occurring; but they produce a greater variety of symptoms, because the tissue is connected with a greater variety of organs and functions. Witness the different groups of disorders attendant upon the extension of congestion or inflammation from the lining of the nostrils to the conjunctiva, to the fauces, and thence down the dissimilar passages of the trachea and the œsophagus. Some of the indications afforded by the tongue depend upon the continuity of its covering with the mucous membrane of the alimentary canal; others upon the similarity of its tissue, and its consequent liability to be similarly affected by the morbific agent present in the system.

4. Diseases are likewise related by contiguity of structure. The inflammation of the subcutaneous cellular membrane in some forms of erysipelas; the extension of inflammatory action from the fibrous to the serous membrane of the pericardium, as well as to the muscular substance of the heart; carcinoma passing from the uterus to the bladder and to the rectum; are sufficient examples.

5. There is a vast class of disorders, comprising especially those of a minor or secondary character, and occurring frequently as symptoms rather than as primary diseases, which, in the present state of our knowledge, we are obliged to content ourselves with referring to sympathy. All the organs and functions are so far connected with each other, independently of any mutual subserviency, or cooperation for particular purposes, that the disturbance of one is apt to be attended by similar accidents in the rest. This relation could scarcely be ascertained during health; for, although we speak of the harmony subsisting between the functions, and imagine what may be the agents and promoters of it, we should have had no just reason for inferring, from the observation of healthy occurrences, that this consenting action was in any respect owing to communications between the organs. It might have been more naturally attributed to the merely concurrent results of the several trains of causes belonging to the respective parts. But when any part is injured, we soon perceive that, in order that even distant organs should participate in the mischief, it is not needful that the latter should have been dependent upon the former, or that they should have been engaged in the same office, for they are found to betray a connection which is neither that of interest nor of business; a connection which is only developed in times of danger and distress. This connection, which gives unity to the whole system, is closer between some parts than others, and differs greatly in degree in different subjects. The latter observation holds remarkably with the inferior classes of animals, as compared among themselves, or with man; but the higher the organisation, the more intimate is the connection between its parts. We cannot offer an instance more obvious and unequivocal than the sympathy

between the heart and every portion of the system, as evidenced in the alterations of the pulse in various diseases; but while its sympathy is all but universal, we know that it is far more seriously implicated in the disturbances of some parts than of others; for instance, in an injury of a serous membrane, as contrasted with a wound of the integuments. But even the latter may, in some constitutions, set up a violent commotion throughout the system; a fact illustrative of what has been already stated, of the different degrees in which the sympathy is manifested. The mutual influence between disorder of the brain and that of the capillary actions, whether of circulation or of secretion (as in typhoid fever); the influence of violent emotions upon the secretion of the gastric juice, bile, urine, &c.; and the wide-spread sympathies of the stomach, belong to the present category, and are probably indebted to the same vehicles of communication, viz. the ganglionic nerves. But we must be careful to exclude all those morbid sympathies which belong to various parts of the cerebro-spinal system, and which constitute in themselves a host of symptoms. The latter are sometimes designated as sympathies of relation, while those of which we have been speaking are called organic sympathies. The sympathies of relation include the all but infinite variety of disturbed sensations and motions. If the derangement begins in the central parts of this system, its diffusion may have no limits but those of the related nerves; but when it commences in a part of the periphery, its extension to another part can only occur by the intervention of the central organ. The wandering pains, the sensation of debility, the actual loss of power, the involuntary convulsive movements, the rigors, and the mental depression experienced at the outset of fever, exemplify the operation of a morbific cause on the cerebro-spinal centre. The irritation of a nerve in an inflamed gum may be followed by spasm of the hands and feet, or of the muscles of the glottis. This is an instance of morbid action communicated from the nerve to the spinal cord, and from this to the nervous expansions in the muscles. Many of these sympathies might be classed under the second of the foregoing groups, since they are manifested in organs associated for some common function.

Such appear to be the principal circumstances which determine the association of morbid actions. It would be impossible to effect a classification of *diseases* upon these principles, because they may all be exemplified in the course of one malady, or even contemporaneously. In completion of this view, it will be desirable to advert to some instances in which the supervention of a disordered action may extinguish one previously existing, or in which the disappearance of one is the signal for the accession of the other; the former constituting revulsion or derivation, the latter metastasis or conversion.

6. *Revulsion* is exemplified in such cases as the following: — congestion of the cerebral capillaries may be removed by congestion in the hæmorrhoidal vessels; subacute inflammation of the bronchial membrane by a cutaneous eruption; dropsy of the peritoneum by diarrhœa; a spasm of the bronchial fibres by dysphoria, or fidgets. We have known an inveterate asthma which had existed for years superseded by tic-douloureux. Blisters, issues, and setons, are artificial measures intended to imitate the curative operation of one diseased action upon another. Hence they are called revulsives, or counter-irritants. The establishment of a secondary affection to the exclusion of the primary is manifestly the very opposite of sympathy, in which there is a reciprocal maintenance of the diseased conditions. It occurs more frequently in parts of similar

anatomical constitution, as when irritation of the skin relieves that of a mucous membrane. We think, also, that the relation is oftener manifested between actions similar in kind: thus a rubefacient is better adapted for the removal of internal congestion than of a suppurative disorder, for which a seton or issue would be more appropriate.

Revulsion has been observed by physicians in all ages, and the attempts to explain it bear the stamp of the medical theories current at the respective periods. Thus the oldest theory was an offset of the humoral pathology. According to this system, *revulsion* took place when the flow towards the diseased part was interrupted or diverted; while *derivation* was effected by the abstraction of the humour from the part. "Fluentium humorum revulsio medela est; derivatio autem, eorum quæ jam obsederunt membrum." (Galen, *De Arte Cur.*, lib. ii. c. 2.) The former, when imitated artificially, was practised as remotely as possible, while the latter was directed to a neighbouring part. Thus bleeding in the foot, or cupping over the liver, was a revulsive measure for disorder of the brain; but bleeding from the nostrils, in such a case, was derivative. In modern times it has been usual to refer the process to the general law, that the system cannot easily maintain two morbid actions at the same time, and consequently the occurrence of a new disorder may remove that previously existing. This principle is undoubtedly true, but it is not confined to disease; it may be included in a still more comprehensive law, found to govern even normal actions. In the development of the system the nutritive activity is by no means equally distributed. The disproportionate growth of the upper and lower extremities, of the cranium and the pelvis, of the heart and the liver, at different periods of human existence, are striking instances. The law of "balancing of organs," observed throughout the animal series, belongs to the same class of facts; the excessive growth of one part being compensated by a deficiency of others; and, as disease is but a form of vital action, it might be expected, upon analogy, to manifest an obedience to the general law. The mode in which this law is observed may often be traced with considerable distinctness. Vital action in the form of nutrition and secretion, if increased, must require a corresponding supply of circulating fluid, which will consequently detract from the rest of the system, unless a particular provision is made for the increase, such as is effected during pregnancy and lactation in the human female, by suppression of the catamenia. The mode in which augmented nervous action in one part becomes vicarious of nervous disorder in another, cannot be thoroughly elucidated till more is known of the nature of that function; but we may sometimes trace its connection with alterations in the distribution of blood to the corresponding parts. We have noticed the difference between revulsion and sympathy; but the latter is often the parent of the former. Thus the secondary disorder induced by sympathy may become sufficiently intense to extinguish that which called it forth. Sometimes the action which we hoped would prove revulsive becomes mischievous by sympathy. Witness the aggravation of inflammatory action by the irritation of a blister, or even the production of a new action, either in the way of direct sympathy, or through the intervention of the excited circulation.

The circumstances which favour revulsion are the reverse of those upon which sympathy depends. An excess of nutrient fluid (plethora) may enable two organs to maintain an increased action at the same time, and therefore practitioners often resort to bleeding and other evacuants, before venturing upon the use of blisters.

That state of the system which is called *irritable*, or susceptible of

disease, seldom allows of revulsive action; the secondary disorder more frequently reacts upon the primary, or provokes fresh derangement, either by direct communication, or by the augmented action of the heart. In children this disposition is very manifest, and appears to depend upon the activity of the textural functions, upon the irritability of the heart, and perhaps, also, upon a more lively consent of parts. They are notoriously doubtful subjects for counter-irritation, which, in fact, is very apt to run into coirritation. Again, if the supervening disorder is seated in an associated organ, it is more likely to increase than to diminish the original one, and consequently such a part ought not to be selected for an artificial revulsion. No prudent practitioner would apply a sinapism to the mammæ, for the cure of increased action of the uterine system, as in menorrhagia; but he would be glad to avail himself of the sympathy between these organs in the opposite condition of amenorrhœa.

7. *Metastasis* is often confounded with revulsion, but it differs from the latter in the fact, that the second action is not observed until the first has disappeared. The name implies change of place; and, at the time of its introduction, the prevalent belief was, that when a disorder changed its seat, a morbific matter had been transplanted from one part to another. The subsidence of a cutaneous eruption may be followed by inflammation of the bronchial membrane, and a similar relation may be observed between the latter and inflammation of the mucous surface of the intestine. The sudden cessation of hæmorrhois may induce disorder of the brain, such as a transient giddiness, or a fatal apoplexy. Metastasis is observed to occur more frequently in some diseases than in others, as in the instances of gout and rheumatism flying from part to part.

The pathology of these affections is somewhat too complicated to be entered upon at present. We must content ourselves with stating what we consider to be the law of metastasis; namely, that the liability of a disease to metastasis is in an inverse ratio with its dependence upon local causes; whence it may be inferred, that the occurrence implies a fault in the general system. In a plethoric subject, the removal of a determination of blood to a particular part by means which do not reduce the quantity of nutritive fluid, is very easily succeeded by similar disease in some other organ. Congestions dependent upon irritability of the nervous system are likewise migratory. We shall find the principle of very extensive application in pathological inquiries. There are cases, however, in which the cessation of a purely local affection is almost certainly followed by disease elsewhere. We allude to those in which a disease has been so long fixed in an organ as to have become a sort of necessary function to the whole system, or in which other parts have gradually become accommodated to it, so that upon its removal the harmony is again disturbed. Thus an ulcer may have existed so long that either the whole quantity of the blood, or the relative distribution of it to the several organs, has been adjusted to the action on the morbid secreting surface. The healing of the ulcer is, therefore, very likely to cause excessive determination to some internal organ; and that such events often take place in this order is matter of every day's experience.

We have remarked that a disease is sometimes spoken of as a collection of morbid states or actions, sometimes as one of these to which the rest are secondary. Thus pleurisy may imply the whole group of derangements coexistent with or dependent upon inflammation of the pleura, or it may be restricted to this condition alone, which is the essential disease, the

rest being called its symptoms. The name is in this case taken from the part affected, which is called the *seat* of the disease.

Symptoms often lead us to the knowledge of the primary disorder, and then they are regarded as *signs*. But there are many signs of disease which cannot be called symptoms. Such are those impressions made upon the senses of the observer by the merely physical condition of the diseased organs; as, for example, the sounds elicited from the chest by percussion, or heard by applying the ear, or the stethoscope to this region; the feelings of softness, hardness, elasticity, smoothness, &c. discovered by touch; the changes of colour; the odours emitted, as from the lungs, in gangrene; and many others. Symptoms, on the other hand, are necessarily vital actions disordered, and may be signs or not, according as they are viewed in relation to some other derangement. Cough is a symptom, being a convulsive action of the respiratory muscles, and it may be a sign of inflammation of the mucous lining of the air-tubes; though a more decisive sign of this condition is a peculiar musical sound heard on listening to the chest, and dependent on a purely physical condition of the parts. Signs are *objective* and *subjective;* the former are such as may be discovered by the physician; *e.g.* the countenance, the pulse, the secretions, the movements, &c.; the latter are those which can only be ascertained from the patient's communications, being modifications of his feelings. In the investigation of infantile diseases, or of cases in which imposture may be suspected, we have to depend upon the objective signs. Signs which enable us to distinguish diseases, which might otherwise be confounded, are called *diagnostic;* and a single sign peculiar to one disease is said to be *pathognomonic.* Those which denote the probable issue of the case are *prognostic,* and those which indicate the proper remedies are *therapeutic.*

In a special disease, that morbid action to which the others are secondary, and which is often distinguished as the essential disease, is likewise called the *proximate cause.* But, before explaining the precise meaning of this term, we must say a few words respecting causes in general.

We must once more advert to the fact, that a disease (*morbus, νόσος*) is a collection of symptoms, or we shall have but an indistinct idea of the classification of its causes. The most ancient division of causes was into *causæ abditæ,* and *causæ evidentes;* the former were also called *continentes:* they were such alterations in the elementary composition of the body as produced the symptoms; but, as their existence was inferred or conjectured, rather than demonstrated, they were called *occult,* in contradistinction to the more manifest. They correspond to *proximate* causes, while the *evidentes* answer to the *remote* causes of modern authors.

Galen subdivided the causæ evidentes into *procatarcticæ* or *præincipientes,* and *proëgumenæ* or *antecedentes;* the former were external morbific agents, the latter internal conditions disposing to disease: they correspond pretty closely to *exciting* and *predisposing* causes. Some pathologists have been content to divide causes into *internal* and *external;* others have distributed them, not according to their source or their position in time, but according to their nature; as, for instance, into *mechanical, chemical, vital,* or *physiological.* But, if causation is rightly understood, there can be no difficulty in determining what is the best classification of causes. The causes of any event are antecedent events occurring in a certain series or chain of sequence; consequently, the best character for their arrangement is the order in which they occur. The last of the series, or that immediately prior to the event called the *effect,* is considered most essential to the result, because the others are never known to be followed by the

latter, unless the former has intervened. This, then, has been called the *proximate* cause, and the events prior to it are *remote* causes, which are subdivided into predisposing and exciting, the former of these being more remote than the latter. The predisposition may have existed from birth, undeveloped, but the exciting cause is followed at once by the immediate cause of the disease. Thus a tuberculous habit is the predisposing cause of phthisis, and a cold may be the exciting cause of that change in the tuberculous lung, which is the proximate cause of the cough, dyspnœa, hectic fever, and emaciation, which constitute the disease phthisis. It has sometimes been argued, that the proximate cause cannot be separated from the disease itself, which would be quite true if "the disease" implied only the morbid action upon which the symptoms depend: but this is not the case, for we still are ignorant of the proximate cause of many diseases. The *names* of maladies are often taken from the proximate cause, and we may think of the latter only when the name is presented to us, instead of the group of symptoms of which it is the symbol. Thus, pericarditis signifies inflammation of the pericardium, which is the proximate cause of certain symptoms; but the name fixes our minds more upon the anatomical condition of the membrane, than upon the symptoms belonging to it. We have stated what we believe to be the correct use of the terms; but as pathological knowledge advances, we shall be enabled to separate the primary from the secondary disorders with greater precision, and the term disease will, perhaps, be restricted entirely to the morbid action, which, in any given malady, is the cause of the others. Disease will not *then* import a collection of symptoms; it will be identical with what we now speak of as the proximate cause.

It is obvious that disease must appear in forms of all but infinite diversity, if we consider only the complexity of the living actions themselves; but when we think of the variety of forms produced by the association of morbid actions, it is evident that they may be as numerous as the individuals in whom they are witnessed. In order, therefore, to facilitate the study of objects which would at first sight appear to present so bewildering a variety, it has been in all ages the endeavour of medical philosophers to reduce diseases into their elementary constituents; in other words, to resolve disease into a few simple forms, the combinations of which compose those specimens which are presented to the medical practitioner. This kind of investigation belongs particularly to *pathology*. In recent times this term has been often used almost synonymously with morbid anatomy; but it properly signifies that department of medical science which is occupied with the *proximate* causes of diseases, in contradistinction to *etiology*, which treats of the remote causes. But as a proximate cause is itself a diseased action, or, in other words, *disease as the cause of disease*, it is clear that pathology in the above sense really implies the science of diseased actions. Now as physiology, or the science of healthy action, is divided into special and general, the former being that which treats of the functions of particular organs, while the latter embraces the more simple functions, which are fundamental, as it were, to the others, and which occur in every part of a living system, we may, in like manner, divide pathology into special and general; the subjects being respectively either the diseases of particular organs, or those which are common to the whole system. Physiology is based upon the examination of the structure of the organism, upon the chemical analysis of the solids and fluids, and upon the observation of the phenomena in the living body. Correspondently, the science of disease rests upon pathological

anatomy and chemistry, and upon the observation of morbid occurrences by the bedside.

We now proceed to give a brief outline of certain diseases which are common to nearly all the organs, because they implicate tissues and fluids common to those organs. Though not absolutely elementary, they are less composite than special maladies, to which they stand in somewhat the same relation as the proximate principles in organic chemistry to the textures into which they are formed. They may be arranged according to their seats, or the parts in which they occur, viz. *the capillary vessels, the blood, the extremities of nerves*, and *contractile fibres.* The diseases belonging to the first of these divisions are, 1. Alterations in the quantity and the motion of the blood: these will be found to be excess in the quantity, called *local plethora*, or *congestion*, or *hyperæmia;* deficient quantity, or *local anæmia;* excessive quantity, with loss of motion, or *inflammation;* elimination of blood, or *hæmorrhage.* 2. Diseased secretion (restricting this term to the separation of substances not entering into the normal composition of the tissues). This group includes a great number of diseases; for instance, some of the terminations of inflammation, as *fibrinous* and *purulent* secretion, *serous* secretion, comprehending all the dropsies; also *tuberculous* secretion, *carcinomatous, melanotic*, &c. &c. 3. Diseased nutrition; (*a*) as to the number of the molecules, comprehending *hypertrophy* and *atrophy;* (*b*) as to the consistence of the tissues, as *softening* and *induration;* (*c*) as to the predominance of absorption over deposition or *ulceration;* (*d*) as to the misplacement of the nutritive deposit or *transformation;* and, lastly (*e*) the cessation of nutrition, or *mortification.*

The second division includes excess or deficiency of the blood throughout the system; viz. *general plethora*, or *hyperæmia*, and *general anæmia;* likewise abnormal states of that fluid, which may be arranged under the term *cachæmia.*

The last division, comprising diseases of nerves and contractile fibres, includes a host of morbid affections, which are often confounded with disorders of the circulation and other capillary actions, because they are often associated with them. But they may exist separately, and imitate the others. They are disorders of feeling and of motion, and may be arranged under the heads of *hyperæsthesia*, or exaggerated feeling; *anæsthesia*, or defective feeling; *dysæsthesia*, or perverted feeling; *spasm*, or irregular contraction; *paralysis*, or defective contraction. These affections are often dependent upon diseases of the central organs of innervation, but as they may exist separately, and be traced to a purely local origin, we have considered them deserving of a place among our pathological elements.

DISEASES OF THE CAPILLARY SYSTEM.

I. DISORDERED CIRCULATION.

Congestion. When the capillaries of a part contain more than the natural quantity of blood, they are said to be congested. In degree, this state varies from a transitory fulness scarcely interfering with the function of the part, to a distension which may lead more or less directly to the complete suppression of the function, or to the disorganisation of the structure. This condition has sometimes been called excessive determination of blood. It bears a considerable resemblance to the turgescence of

erectile tissue, but differs from it, in being for the most part abnormal, both with regard to the structure and to the function of the part. Congestion may, however, occur as a healthy condition in other parts than erectile tissue; for instance, in those which require a temporary increase of vital action. The ovaries and lining membrane of the uterus are in a state of congestion during menstruation. The mucous membrane of the stomach presents a similar condition during the secretion of gastric juice. In some of the lower animals congestion is very well-exemplified in the neighbourhood of the genitals at the period of heat. In parts which have not completed their growth, the capillaries are found more injected than elsewhere; as, for instance, in the extremities of the long bones. This physiological kind of plethora has been called *turgor vitalis*, or a state of greater vascularity than usual, and it always indicates augmented function of the part.

Instances of morbid congestion will offer themselves when we inquire into the circumstances which produce it. But we must, in the first place, allude to the nature of the capillary circulation. The capillary vessels are very fine tubes of equal calibers, interposed between the extremities of the arteries and veins, and having a reticular distribution. The motion of the blood in these vessels is dependent upon the impulsive action of the heart, but it is susceptible of considerable modification from causes confined to the capillaries themselves, such as the nutrition and secretion in the part, and the state of the nerves. In the lower departments of the animal kingdom, the circulation is much less dependent upon a central organ of impulsion than in the higher; and although, as we ascend the scale, the function appears more and more centralised, we may still find, even in the highest, the traces of its more diffused condition. In other words, the causes which in some animals suffice to maintain the motion of the blood in the capillaries without the assistance of a heart, are in others, only capable of modifying it. Among the causes alluded to, the vital contraction of the vessels, or movements of the particles of blood unaffected by the vessels, has been supposed to play important parts; but, upon these points, there is great diversity of opinion.

General plethora is very favourable to congestion; but, as it will not account for the disproportionate quantity of blood in any one part, there must be some local circumstance concurring to produce the effect. The same remark applies to increased action of the heart, and likewise to venous obstruction, provided the cause of the latter is seated in, or operates through, the right side of the heart; for, if the impediment affects only a venous trunk, its influence must be more or less local. Besides these predisposing states in the general circulation, there is another cause, the operation of which is less clearly understood; we allude to a peculiar irritability of the nervous system, which leads very frequently to congestion, and which is common in hysterical females. It is highly probable, also, that certain states of the blood itself deserve to be ranked among the predisposing agents.

The local causes of congestion may be arranged under the following heads:— 1. Attraction, or determination of blood to the capillaries. 2. Detention of blood in the capillaries. 3. Venous obstruction.

1. Blood in some cases is evidently attracted in greater quantity to the capillaries. We have already adduced instances of this with reference to physiological congestion. When the function of an organ is overtasked, blood is determined to it more abundantly than usual, as in congestion of the brain from excessive study; of the eye from its long-continued exercise;

of the liver, when this organ (as in warm climates) is used vicariously for the lungs. Blood is also attracted to a part by the presence of a foreign body; as of a particle of dust in the eye, or of a thorn in the skin; by a blow, or by the excitement of heat, or of a medicinal agent, which acts neither mechanically nor chemically, such as cantharides. This kind of congestion is generally called irritation *, the term being transferred from the action of the irritating cause to the state which results from it; and hence it is employed still more laxly to indicate active congestion, even when the latter is not traceable to an external agent; and not uncommonly we find it used as a synonym of disorder in general. It may be remarked, however, that the latter uses of the word have reference most frequently to disease in the skin and the mucous membranes; the reason for which appears to be, that disease in these structures is often observed to be the consequence of foreign agency. Thus, while we speak of irritation in the alimentary canal, the lungs, the bladder, &c. we rarely apply the word to the brain, the liver, or the kidneys, unless indeed, as in the latter organs, the disease manifestly results from the action of a foreign body—a calculus, for instance. Congestion from irritation is often preceded by some derangement of sensation (*e.g.* pain, itching, tingling, &c.); and this might be supposed to be the cause of the attraction of blood, were it not that this effect may occur when there is no sensation at all, as in a part which has suffered paralysis. The congestion is often found in the vicinity of some organic disease; and may be attributed to the irritation of the morbid deposit, though it not less frequently depends on venous obstruction. Determination of blood cannot be always traced to the above causes; but our knowledge of the insensible molecular actions is far too limited to forbid our conjecturing that there may be forms and degrees of them, which may produce an excessive attraction of blood, though we fail to discover any irritating body, or any previous exaltation of function. To such causes we must assign many instances of spontaneous and sympathetic disease.

2. The blood is often detained and accumulated in a part, the vital action of which is below the usual standard. This is exemplified in organs which have been subjected to long-continued excitement, as in parts recovering from inflammation, or under the sedative action of cold, and in the extremities of aged persons. In these cases the diminution of the molecular actions of nutrition and secretion retards the flow of blood, and thus leads to its accumulation. Sometimes this effect appears to be less immediately the result of the lessened vital action, and to depend rather on the predominance of mechanical forces, as when gravitation produces congestion in the posterior regions of the lungs in persons who lie on their backs for a long time without changing their position, or in fevers or other diseases attended with general depression of vital power. It is not improbable that the state of the blood may favour such accumulation more or less directly, its constitution being deeply implicated in all changes of vital action.

The sudden suppression of a secretion without any previous impairment

* Few medical terms have been used more vaguely than irritation. Besides the meanings adverted to in the text, irritation is sometimes employed synonymously with vital action (physiological irritation); sometimes it implies nervous derangement as distinguished from vascular or organic disease; and sometimes the excitation of a muscle. We have said above that it signifies both an action, and the state resulting from the latter. But whenever it is applied to an action its meaning is very indefinite. Whether it is a muscle irritated to contraction, or a nerve irritated so as to produce pain or itching, or capillary vessels irritated into hyperæmia, the word gives us no idea of the nature of the action; in fact, it only imports a causative relation between the state of the part affected and some antecedent. Such words as *made, effected, operated, &c.* would often intimate just as much as *irritated*. The phrase "*a needle irritates a fibre to contract*," gives no more information than if we said that it "*makes it contract*."

of the function, produces congestion in a very marked and intelligible manner. The quantity in the capillaries is augmented by the retention of the particles which should have been removed by secretion. Sometimes a vicarious congestion occurs in a distant organ, on the principle of metastasis.

Whether the blood may be detained in the capillaries by dilatation of these vessels, depending on their diminished elasticity, or upon laxity of the intervascular cellular membrane, which causes them to yield unduly to the distending force, is a matter rather for conjecture than of proof. But it is easy to conceive that, as the *vis à tergo* holds a certain relation to the quantity of blood in the tissue, the greater the accumulation, the greater will be the resistance offered to the impelling force; and the motion must, therefore, be more and more retarded.

3. Impediment to the return of blood from the part, by pressure or any other cause of venous obstruction, very frequently induces congestion in a manner too obvious to need further explanation. The mucous membrane of the intestine is often affected with congestion of this kind, depending upon obstruction of the portal circulation. All the above local agents, though capable of producing the disorder in question without the aid of other causes, are greatly favoured by those faults in the general system which have been adverted to.

It is common for congestion to pass into inflammation; frequently, it does not subside until serum or blood has escaped from the loaded vessels. When there is a tendency in the system to heterologous deposits, congestion greatly promotes their formation.

Congestion is often distinguished as active and passive. The former corresponds closely with what we have called congestion by attraction. The term *active*, as applied to this and other morbid states, appears to have a twofold meaning; for it intimates that the disease in question is primary as to the part affected, that is, not preceded by any other lesion in the tissue; and also, that it is connected with symptoms, both local and general, which indicate a certain degree of organic vigour in the system, such, for instance, as plethora and fever, with local heat and increased sensibility.

Passive congestion, on the other hand, corresponding to the other two species described above, may be traced, as we have seen, to previous mischief; it is accompanied with symptoms the reverse of active (such as a weak circulation, torpid sensibility, diminished heat, &c.), and is generally developed by external agents of a depressing nature. It must however be remembered, that congestion may be passive in its origin, and yet active in its character; as when it has been produced by partial venous obstruction, or by the sudden suppression of secretion, in a subject whose vital powers are unimpaired.

The term congestion is, by some writers, restricted to the passive species; and they speak of it as indicating plethora in the venous radicles, while inflammation is produced by a similar state of the extremities of arteries. But the objection to this view is, that no room is left for that kind of congestion which is certainly not passive, and yet falls short of inflammation.

Congestion is the forerunner or companion of so great a variety of lesions, that we can scarcely wonder that some pathologists have fallen into the error of considering it an all but essential ingredient of every disease.

Signs of Congestion. In parts open to view, redness is the most striking indication of this disease. The shade of redness depends partly on the

degree of the congestion, and partly on the mode in which it is produced. Thus, while it is brighter and more florid in active congestion, it is of a darker hue in the passive, often inclining to purple, and even black. In some parts it may be ascertained by the increase of volume; as in the liver and the spleen. But when the organ cannot be examined by the senses, the existence of congestion may be inferred from the disturbance of function, taken in connection with symptoms in other parts, and with the general state of the system. The functional disorder is scarcely ever alone characteristic of this lesion; but when it concurs with certain other conditions known to be often associated with it, or when the affection is vicarious of derangement of an organ, in which, from its being more open to direct examination, congestion had been clearly recognised, we may be pretty sure of the existence of this state.

To take an example—headach, giddiness, and confusion of thought, may be caused not only by congestion but by a great variety of other disorders of the brain; but if these symptoms are much aggravated by the recumbent posture, by stimulants, by causes increasing the heart's action (exercise, for instance), and still more if they have succeeded to hepatic or splenic engorgement, there can be little doubt as to the state of the cerebral circulation.

In what manner an excess of blood interferes with the local function can seldom be more than guessed at, because we understand so little even of the normal instrumentality of blood. We know scarcely more than the fact, that a certain proportion is required, and that variations of its quantity, as well as changes in its quality, lead inevitably, sooner or later, to derangement. It may be conjectured, however, that while a certain increase of quantity may augment the vital action, something more than this may exert such a degree of pressure as will interfere with the molecular movements. Congestion is sometimes inferred from the hæmorrhage and serous secretion which it occasions, when the fluid products are effused on surfaces which enable us to observe them, or from a similarity of the symptoms and the causes to those presented by cases in which such effusions were known to have taken place. Another and very important source of evidence is, the effect of remedies, the nature of which may, as in many other cases, give us most convincing proof of the nature of the disease which they removed.

To distinguish congestion from inflammation is often difficult. The local symptoms are often precisely similar in their character; but, in the former, they are for the most part less intense, and less permanent, and they are attended with a slighter degree of fever. The anatomical differences are more decided; for the blood is not stagnant in congestion, and the state is much less productive of disorganisation. Congestion is not often fatal, except by the morbid states which it engenders. The most suddenly mortal of these is hæmorrhage, both when the blood escapes from mucous membranes in such quantity as to occasion syncope, and when it is retained in parts the function of which is obstructed by its presence, as in the brain. But congestion is itself adequate to the speedy extinction of life, of which we have proofs in that form of apoplexy which presents no other lesion than extreme injection of the cerebral capillaries, particularly in the grey matter, and more rarely in asthma, attended with such an amount of congestion in the bronchial membrane as produces asphyxia.*

The evidence of congestion derived from appearances in the dead body

* See a case in Dr. Parry's Elements of Pathology, p. 199.

is very equivocal. This state, though it existed during life, may disappear at the time of death; or it may not have existed, and yet be exactly imitated by cadaveric changes. There is, then, a cadaveric congestion as well as a vital. We shall offer one or two remarks on the former, before endeavouring to point out the mode of distinguishing it from that which occurs during life.

Andral makes two divisions of cadaveric congestion or hyperæmia:—1. that which is produced at the time of death; and, 2. that which occurs after death. The former is the effect of the mere emptying of the arteries into the capillaries by the contraction of the former; but the degree of it is very much influenced by the mode of death. Thus, if the subject died asphyxiated, the venous obstruction will cause the capillaries to be much more loaded by the above process; while the reverse will happen if death took place by syncope. The second kind of hyperæmia is well-exemplified in the hypostatic, or that which is occasioned in depending parts by the mere gravitation of the blood. It is observable in that part of the scalp which covers the occiput, and in the skin of the back part of the neck, trunk, and extremities. Sometimes there is not only engorgement of the capillaries from this cause, but even effusion of blood by transudation into the cellular membrane. These appearances are particularly marked in loose cellular tissue; in the scrotum for instance of the male, and in the labia of the female. Hypostatic congestion is found likewise in the posterior portions of the lungs and the abdominal viscera; but the mode of its production is best shown in the intestines, which may present complete paleness in the convolutions which are near the surface of the abdomen, while those which occupy depending situations, the pelvic cavity for instance, are of the deepest crimson hue. Another species of the cadaveric hyperæmia has been described by Andral, viz. that which is caused by transudation; but it seems scarcely proper to speak of the change in question as hyperæmia, which signifies an accumulation of blood *within* the capillaries. No doubt the transudation is more likely to occur where the congestion exists, but still the latter is very distinct from the former. The redness, however, produced by the transudation is of a nature which may very well be mistaken for some forms of congestion. Transudation occurs frequently in the vicinity of large veins, and is favoured by fluidity of the blood, and that softening of the tissues which occurs in incipient putrefaction.

Seeing that both gravitation and transudation may operate during life, these causes will not serve unaided to distinguish the cadaveric from vital congestion; nor will the intensity or the diffusion of the redness be alone sufficient, though they may help our judgment. But we may observe that the brighter the hue, and the less diffuse the redness, that is, the more it is distributed in lines and points, rather than in stripes and patches, the more reason we shall have to assign it to vital causes; and this view will be much corroborated if we find it in parts from which gravitation would have tended to remove it, and if there are no appearances of venous congestion. This subject is of the greatest importance with regard to the pathological appearances of the alimentary canal.

Local Anæmia. This state is the opposite of congestion, being a deficiency of blood in the capillaries; but it is much less frequently an independent disease. As we found augmented vital action to be a cause of congestion by attraction, so we may now observe that diminution of it, for the converse reason, produces anæmia. This is exemplified in the muscles,

ovaries, mammæ, and testes, when these organs have been long in a state of inaction, and in limbs which have been paralysed.

A more direct mode of production is compression of the artery which supplies the anæmial organ, or of the tissue itself, and consequently of the included capillaries. Congestion in one organ may induce anæmia in another by mere diversion of the circulating fluid. Thus it is not uncommon to find the mucous membrane pale, when the peritoneal and its subjacent cellular membrane are loaded with blood. The constipation met with in cases of determination to the vessels of the brain may be often attributed to the deficiency in those of the intestines. The temporary anæmia observable in the skin during the rigor of fever, or under the influence of cold, is very probably owing to contraction or spasm of the extreme arteries. It is, however, extremely difficult in any given case to determine that this contraction is not the effect, rather than the cause, of the anæmia, the latter being the result of diminished molecular action, and consequently diminished attraction. Schwann's experiment of causing contraction of the mesenteric arteries of a frog, by applying cold to the membrane, might be interpreted in this manner. Changes in the nervous function have a remarkable effect in producing anæmia. Witness the paleness of the face during some kinds of mental affection, not less remarkable than the fulness of the vessels produced by other emotions. Andral asks, with great sagacity, "Who shall say that emotion may not exert the same influence on the stomach as on the skin, making it pale at one time and reddening it at another? True, the anæmia is in such cases only momentary; but should the state of the nervous system which has once produced it occur frequently, the anæmia may become habitual; hence the pallid faces of men much engaged in intellectual labour, or harassed by strong passions, or possessing what is called the nervous temperament, but in whom there is no evidence that any particular organ is disordered." (*Anat. Path.*, tom. i. p. 76.) Some parts are deprived of their due proportion of blood by gravitation. This is experienced in states of great debility by the brain more than by any other organ; and the nature of the disorder is indicated by the relief which the recumbent posture affords. Andral intimates his opinion, that organs appearing anæmial, less from a scanty supply of blood than from want of the colouring matter, are instances of degenerations towards a condition which is normal in the white-blooded animals. The analogy certainly appears a strong one, but we apprehend that the occasions are very rare in which an apparently bloodless condition of the organ can be accounted for in no other way than by the supposition of a special deterioration of growth.

Signs of Local Anæmia. On the outer surface of the body, local anæmia may be readily detected by the paleness of the part, and by its lessened volume. But for indications of its existence in organs removed from sight, we must depend upon the local disorder of function, and upon its sympathetic accompaniments. Even these are extremely equivocal, and require to be interpreted by signs taken from the general condition of the body, by the absence of any proof of the opposite condition, by the mode of its production, and by the effects of remedies. Anæmia of the stomach often produces dyspeptic symptoms scarcely to be discriminated from those attendant upon chronic congestion, or inflammation, or even scirrhous disease, and is discovered only by ascertaining a general deficiency of blood throughout the body, or an undue distribution of it to other parts, as for example to the brain; or by learning that these symptoms followed the use of food less stimulating than ordinary; or that they were manifestly

alleviated by taking substances (aromatics for instance) which are known to attract blood to the villous lining.

The necroscopic signs are scarcely less ambiguous than those of congestion; for, by the operation of cadaveric changes, blood may have found its way to one part which was scantily supplied during life, just as it may disappear from another where it was superabundant.

Inflammation. Inflammation consists not only in engorgement of the capillary vessels of the part, but also in the arrest and coagulation of the circulating fluid. It occurs under circumstances precisely similar to those which favour or produce congestion; and, in fact, the latter is the incipient stage of inflammation, though it may also exist (as we have seen) as a separate lesion. Inflammation moreover may be divided, like congestion, into active and passive, according to the mode of its production, and to the symptoms which accompany it. Congestion is apt to be converted into inflammation, when its causes act with great intensity, that is, 1. when the blood is attracted in so overpowering a quantity that the ordinary powers of the capillary circulation are unequal to the disposal of it; 2. when the vitality is so low that the motion is not only retarded, but suspended; and, 3. when the venous obstruction is so considerable as to have the same effect. Inflammation is also more likely to occur when the accumulation has not been relieved by the exudation either of blood or of serum, nor by an increase of the normal secretion of the part.

The process of inflammation has been carefully observed by the aid of the microscope; and these are the principal phenomena:—At first, the globules of blood are seen upon the application of the stimulus to move more rapidly, and the currents are somewhat smaller in diameter; but this is soon succeeded by dilatation, and near the point of irritation the motion is slower. In the surrounding parts blood begins to accumulate, and there is a general afflux from the more distant points of the reddened surface to the point of irritation as a centre. At this time the particles may be seen to flow in a direction retrograde to the usual course, and to find channels not previously observed. The next and most important phenomena are the stagnation of the blood in the central part, its coagulation, and the disappearance of the globules in a confused mass. Inflammation is now established; the colour of the part varies, according to the stage of the process, from vivid red to dull crimson or black. The arteries leading to the spot are more distended than usual; and they have been proved by Dr. Alison to lose much of their tonic contractility.* The veins leading from the inflamed member yield a larger proportion of blood than those of sound parts.

It has been long a warmly disputed question, whether inflammation is to be regarded as increased action. The facts just detailed are obviously quite incompatible with the notion of increased action (*i. e.* contraction) of vessels. But if increased action refers to the quantity of blood in the tissue, and to the state of the neighbouring parts, it certainly must be predicated of inflammation. The great afflux of blood, the heightened colour, the augmented bulk, the exalted sensibility, the increase of temperature, the throbbing arteries and distended veins, not to mention the subsequent products of serum, fibrin, and pus, present a collection of phenomena which it is difficult to separate from the idea of increased action or commotion; but it is quite certain that there is weakened action of the vessels, with diminished function of the tissue. As inflammation will be treated of more at large

* See Trans. of Brit. Assoc. vol. iii.

in another portion of this work, we have only attempted to say as much as seemed requisite for pointing out the relations of this with other pathological conditions.

Elimination of Blood, or Hæmorrhage. The escape of blood from its vessels in disease was formerly attributed to the same kind of lesion as that which results from accidental injuries, viz. the division or the rupture of a vessel. The general belief on this subject, however, was greatly modified by the researches and reasonings of Bichat, who maintained that, although blood may be effused in consequence of the destruction of a vessel, as in ulceration, or in some instances even by rupture, yet in the majority of cases it is effused from the open mouths of exhalant vessels. He grounded this opinion partly upon his having failed to detect any appearance of rupture, after a minute examination of surfaces which had been the sources of the hæmorrhage, and partly upon the similarity or identity between the causes of this action and of morbid exhalation: and it is now universally admitted that hæmorrhage may take place without any discernible disorganisation, as for instance upon a mucous membrane. But when Bichat spoke of exhalant vessels, he described the visions of his fancy rather than matters of absolute observation; their existence has never been proved, and even the capillary vessels have no terminations by open mouths; consequently, whatever passes from them must either transude through their parietes, or escape by their rupture. The size of the globules of the blood precludes the idea that they could exude by passing through pores in the vessels, though the liquor sanguinis, with colouring matter in solution, might so find its way out; and we are therefore driven to the other alternative, which becomes exceedingly probable from other considerations; such as the tenuity of the parietes, the great pressure sometimes exerted upon them, and the likelihood that depraved conditions of the blood itself should be accompanied by such changes in the substance of the containing part as would produce a tendency to rupture. That this lesion should have eluded observation is a necessary consequence of the fact, that the vessels themselves are invisible, their existence being a matter of inference only.

The local disorders which more immediately precede hæmorrhage are congestion, inflammation, and vitiation of the blood.

The modes in which congestion occurs have been already described. We shall only offer a few examples of congestive hæmorrhage. Epistaxis, or bleeding at the nose, is not unfrequently the effect of the turgescent state of the Schneiderian membrane, produced by the local application of heat, as in a crowded room. Blood may be extravasated in the substance or on the surface of the brain, and cause apoplexy, the local plethora having been induced by narcotic drinks, or by violent emotion; and the mucous membrane of the stomach may pour forth blood under the action of an irritant poison. These are instances of blood attracted to the hæmorrhagic surface. The congestion from venous obstruction is seen to produce hæmorrhage, in apoplexy caused by pressure on the jugular veins; in hæmoptysis dependent on contraction of the mitral valve; in hæmatemesis and hæmorrhois from obstruction of the portal veins; and in the purpura hæmorrhagica observed on the legs of pregnant women. In these subjects the pressure of the uterus upon the iliac veins and the vena cava presents an impediment to the return of blood from the cutaneous vessels, which are consequently overloaded; and thus the fluid is extravasated in dots or patches of various dimensions. Hæmorrhage may also be the effect of congestion ensuing upon a lower vital action in the part; as, for instance, upon the skin when it has been under the influence of cold. In these

several instances we shall, by remembering what was formerly said of active and passive congestion, be enabled to determine whether the hæmorrhage is of the active or passive form, while in cases, the true pathological nature of which may not be immediately ascertained, the accompanying symptoms, such as the strength of the general circulation, the temperature of the skin, and the habit of body as to fulness, or an opposite condition, will often enable us to determine the active or passive character of the effusion.

It might perhaps be expected, that, as in inflammation there is a more complete remora of the blood than in congestion, the former condition would be more productive of hæmorrhage; but this is not the fact. A little further reflection will convince us, that we ought to have inferred this result from the circumstance, that the blood, having become stagnant, has coagulated, that is, lost its fluidity, and that the pressure upon the capillaries has been diminished by the exudation of serum, lymph, and pus. But inflammation is always preceded and accompanied by congestion (which, as we have remarked, is often called the first stage of inflammation), and it must therefore be from the vessels in that condition, rather than in pure inflammation, that the blood escapes. Hæmorrhage, coincident with inflammation, is well-exemplified in the mucous membrane of the colon in dysentery, in which disease there are constant exudations of fluid blood, which becomes mingled with the increased mucous secretion, and with the coagulable lymph. The rusty sanguinolent sputa of patients labouring under pulmonary inflammation consist of a viscid secretion from the cells and minute bronchiæ, impregnated with the colouring matter of the blood; and in a form of pleurisy, called hæmorrhagic, bloody serum and lymph are effused from the inflamed serous membrane. Inflammation of the kidney and of the bladder is sometimes attended with hæmaturia, that is, bloody urine. Hæmorrhage may also be the effect of alteration of the normal tissues by softening and ulceration, or of a new growth. This may be an analogous transformation, as accidental erectile tissue; or hetorologous, as the fungoid form of carcinoma. A vitiated condition of the blood may occasion hæmorrhage, partly on the same principle by which it induces passive congestion, and partly by the indisposition to coagulation. This state of the blood is always accompanied by low vital action in the tissues, as well as on secreting surfaces; and hence we may account for the readiness with which the capillaries give way to the distension. This kind of hæmorrhage is observed to a certain degree in the red spots and patches called petechiæ and vibices, which occur in certain malignant fevers; but still more remarkably on the cutaneous and mucous surfaces of patients affected with scurvy.

The tissues most liable to hæmorrhage are those which, in the natural state, are subject to variations in the quantity of the blood. None present this quality in a more marked degree than the mucous membranes, and accordingly they are found to be the most frequent seats of hæmorrhage. The same remark applies to the parenchyma of the lungs.

Whatever circumstances predispose to, or excite, congestion may be causes of hæmorrhage, though some states of the system appear to induce a more special tendency to it; such are the changes which occur in the organs and functions at particular ages. Childhood has been observed to be prone to epistaxis. This is commonly attributed to the general activity of the circulation in the head, which must particularly affect so delicate a network of capillaries as the Schneiderian membrane. But may it not be traced still more directly to the development of the sinuses and fossæ of the facial bones by the gradual separation of their tables, in harmony with a similar process in the bones of the cranium? For some years after puberty

the lungs are the most frequent source of hæmorrhage, for the same reason that they are rendered liable to congestion at that period, by that increase of their development and exercise, which takes place correspondently with the activity of the muscular and generative systems. In advanced life we meet with hæmorrhage from venous obstruction, and from diminished vital action, both upon the intestinal surface generally, and more particularly at the termination of the rectum. The frequency of cerebral hæmorrhage in old persons is not dependent so much upon these causes, as upon disease in the substance of the organ, and in the coats of the arteries. Instances are occasionally met with of a peculiar disposition to hæmorrhage upon the slightest solution of continuity, such as a scratch, venesection, or extraction of a tooth. In such subjects the fault appears to exist in the blood, which shows little or no tendency to coagulation.

The blood effused in hæmorrhage, if it does not escape outwardly, may be gradually absorbed, or become the matrix of adventitious growths; or, long before these could have time to form, it may have caused fatal injury of the organ by compression, as in the brain; or by obstruction, as in the air-passages.

The existence of internal hæmorrhage is sometimes intimated during life by the peculiar functional disturbance in the organ which is the seat of it, as in some forms of apoplexy; sometimes by physical signs, as in pulmonary hæmorrhage; and sometimes by the rapid sinking of vital power, as in hæmorrhage into the abdomen from extra-uterine pregnancy.

The organisation which the effused blood may undergo is precisely similar to what takes place in an obstructed vessel. It coagulates, and the fibrinous portion, as Dr. Carswell has well shown, has a tendency to a peripheral disposition, inclosing within it some of the inorganisable serum. He does not say what he considers to be the cause of this arrangement; but our own belief is, that it depends upon an attraction between the surrounding tissue (which is irritated by its presence as a foreign body) and the fibrin; a process similar to what occurs when lymph is precipitated from the blood upon the valves of the heart, in inflammation of its lining membrane. The coagulum in the progress of organisation may become a cellulo-fibrous substance; or the areolæ in this formation may be changed by destruction or absorption of the septa into a single cyst containing serum. The cyst is either permanent, or, having lost its contained fluid by imbibition, is obliterated by adhesion of the opposite surfaces, and then converted into a fibrous substance, or ultimately absorbed.* The vascular organisation of the coagulum is similar to that of lymph, and will be described in the next section.

II. DISEASED SECRETION.

Secretion, in its widest sense, is the elimination of substances from the blood contained in the capillaries. Some of these enter into the nutrition of the structure, the rest belong to secretion proper. Under the present head, however, it is not intended to treat of diseased conditions of the follicular and glandular secretions, inasmuch as these fall within the province of special pathology; but of perversion, in kind or degree, of that simple function which may be performed wherever there is living tissue, and the only essential conditions of which are blood and capillaries. It is sometimes distinguished by the appellations, perspirable secretion, or exhalation (when

* See Carswell's Elementary Forms of Disease, fasc. Hæmorrhage.

upon free surfaces), interstitial secretion (in the tissues), transudation, exudation, &c.

We shall first notice the morbid secretion of substances which exist normally within the vessels, viz. fibrin and serum; and, secondly, of substances which do not enter into the normal composition either of the fluids or the solids, viz. tubercle, carcinoma, &c.

Fibrinous Secretion. This action must not be confounded with the effusion of lymph from a divided tissue, as in the healing of wounds by the first intention. When fibrin exudes from capillaries which have undergone no breach of continuity, it is preceded either by congestion or by inflammation. The only instance of this secretion occurring as a physiological action is the formation of the tunica decidua uteri; and it cannot be questioned, that a *turgor vitalis* exists in the surface which produces this membrane. In the reparative growth of parts it is probable that the capillaries which furnish the lymph are in a state of congestion, not of absolute inflammation; but, as a true morbid action, it is preceded by stagnation of blood in the capillaries, that is, by inflammation. Hence it bears the name of *adhesive inflammation.* The nature of this process and the circumstances which favour it, whether in the tissue, or in the form of the inflammation, or in the general condition of the system, will be fully considered in another place.

The secretion of fibrin leads to some of the most pernicious alterations in the structure of organs, as well as to the reparations of injury. Effused on the mucous lining of the windpipe, it may cause death by suffocation; in the lungs it prevents the access of air, and converts a congeries of cells into a dense parenchyma; in the interior of excretory ducts it causes their obstruction and obliteration; in their submucous cellular membrane, as around the urethra, it induces stricture; upon the serous surface of the intestines it effects agglutinations and entanglements of the convolutions sufficient to cause fatal ileus. These are but a few of the injurious effects which might be arrayed in opposition to the instances in which the same process is beneficial.

Lymph is effused in the form of *liquor sanguinis,* which afterwards coagulates. The fluid part is serum; the solid passes under the names of fibrin, albumino-fibrin, coagulable or plastic lymph. The colouring matter may accompany this effusion, or, if the capillaries have been ruptured, blood itself. The serum partly escapes, and partly is entangled in the cellular meshes of the concrete matter. The organisation of lymph is most easily studied upon the serous membranes. The membrane is softened by the inflammation, the lymph presents a number of red spots, from which striæ may be traced by help of the microscope, connected in the form of loops with the vessels of the tissue. The inequalities in the surface of the lymph have been called granulations. This vascularity is the first stage of the organisation, but the mode in which the vessels are formed has been matter of considerable doubt. Some have fancied that carbonic acid, or some other gas, is secreted by the membrane, and, being forced into the lymph, produces channels which allow blood to enter from the tissue, and become vessels; others have thought that the extremities of the vessels are softened and pushed forward by the *vis à tergo* into the lymph; while others, again, have maintained that the vessels are formed altogether by the vital action of the fibrin itself, in the same manner as those of the egg during incubation, and that they afterwards contract relations with the vessels of the tissue. The first of these opinions is entirely hypothetical; the second, to our apprehension, not only presents no solution of the difficulty, but offers another as to the manner in which this elongation of the parietes

can be effected by a force within their calibers. It appears to rest on no other foundation than the continuity between the vessels of the lymph and of the tissue, which may be otherwise explained. The remaining opinion is the most tenable, so far at least as it implies a change in the fibrin independently of the adjoining tissue; but there is no reason for supposing any action more peculiarly vital than that change in the disposition of the particles which takes place in coagulation, and which may be easily conceived to leave interspaces permeable by the liquor sanguinis or blood of the adjoining capillaries. As the substance becomes more concrete, these channels are converted into vessels. The further changes which the fibrin undergoes are very various; for when once penetrated by the blood, which contains the materials of every form of nutrition, it may become the matrix of any of the adventitious growths to which the system is liable,—cellular, serous, fibrous, cartilaginous, and osseous. The selection of these forms appears to be connected in some measure with the nature of the adjoining tissue. Thus the pseudo-membranes in serous cavities are similar to cellular membranes with a smooth surface; in articular capsules they are often cartilaginous; in the subserous tissue of the uterus they are twisted fibrous bodies, having a great resemblance to the fibres of the organ itself. When the new growths are similar to any of the normal tissues, they are called *analogous formations;* when there is no such similarity, they are *heterologous;* but to the latter we shall have occasion to allude in another place.

Serous Secretion. Serum escapes from the capillaries in so many organs in their natural or healthy condition, that its effusion can only be called morbid when the quantity is excessive; which may be observed both on the mucous and tegumentary surfaces, as well as in the cellular tissue and in the serous cavities. On the former it is the cause of fluxes; in the latter of dropsies. The fluid effused corresponds more or less in its chemical composition with the serum of the blood, but the proportion of its constituents may vary considerably. Thus the albumen may be so small in quantity as to render the fluid scarcely more than an aqueous solution of the salts of the blood, or it may be sufficiently abundant to be deposited on the membranes, or to float suspended in the form of flocculi. The colouring principle of the blood may be mingled with it, or it may be impregnated with excreted matter, as bile or uric acid. It is no where found more aqueous than in the ventricles of the brain, whether normally, as the cerebro-spinal fluid of Magendie, or in the augmented quantity which constitutes hydrocephalus.

The conditions of the capillary circulation productive of serous exudation are the same as those which induce hæmorrhage, viz. congestion, inflammation, and depravation of the blood. What circumstances determine the one effect rather than the other, it is not always easy to explain. Some of them, however, we may perhaps be able to point out in the instances to be adduced.

Dropsy may occur in the subcutaneous cellular membrane throughout the body, constituting anasarca; when it takes place in a limited portion, it is termed œdema. When universally diffused, it is the result of one of two causes, either a congestion of corresponding extent, or an alteration in the quality of the blood. The former may be active, as in plethoric persons, and is cured by depletion and abstinence; or it may be passive, as in persons labouring under obstructive disease of the heart. The depravation of the blood occurs in states of the system to be mentioned presently.

Serous effusion from local plethora is witnessed in what has been called serous apoplexy. That in this case serum should escape instead of blood, may be owing to the firmness of the capillaries, or to the congestion not being so intense as to produce rupture, though the blood is sufficiently retarded to permit the exudation of serum, or it may be the result of the attenuation of the blood itself. The œdema which accompanies gout is also an instance of effusion of serum from local congestion. As the result of venous obstruction, it is well-exemplified in the anasarca of the lower extremities during utero-gestation; in the swollen legs of nurses who have been in the erect or sitting posture for many nights in succession; in dropsy of the peritoneum from disease of the liver called cirrosis, which greatly impedes the portal circulation; and in diarrhœa, from a similar cause. Inflammatory effusion of serum is exemplified in the swelling which surrounds a phlegmon — in the elevation of the epidermis in erysipelas, or on a blistered surface — in diffuse inflammation of the cellular membrane — in the œdema which accompanies pneumonia — in the serous expectoration of some forms of bronchitis — and in the collections of fluid consequent upon inflammation of the serous membrane of the brain, of the pleura, and of the peritoneum. That serum should be frequently the product of inflammation in the dermoidal, mucous, and serous tissues, may be explained by reference to a general law, that the specialty of a morbid product is influenced by the normal secretion of the part, the application of which to the tissues just mentioned is sufficiently obvious. The operation of this general law may be prevented by other circumstances. Thus, from the large proportion of albumino-fibrin existing in the blood in some inflammatory diseases, it may happen that lymph shall be effused more freely than serum, even upon the surfaces alluded to. Blood attenuated, that is, having serum in excess, is occasionally productive of dropsy, and is in popular opinion the only cause of this disorder. The effect is the same, whatever may have been the cause of the depravation. Thus we find it in persons who have suffered from inanition, as well as in those who have lost blood by hæmorrhage, spontaneous or artificial: of the former many examples are on record in narratives of shipwrecked crews; of the latter we daily meet with cases among women who have suffered from flooding, and among patients who have been over-bled in acute diseases. There is not a more common effect of the impoverished condition of the blood in chlorotic females than œdema of the feet and legs. Any congestion will, in such subjects, be followed by effusion. Andral speaks of having seen it induced by sinapisms.

The dropsical swellings which accompany the last stages of many chronic diseases are generally of a somewhat complex production, being due partly to obstructions in the heart, or in the lungs, or in large venous trunks; partly, to the diminished vitality and consequent passive congestion in the extremities; partly, to a state of the kidneys, to be spoken of immediately; and, lastly, to an attenuation of the blood. The colliquative perspirations and the diarrhœa attendant upon the close of many diseases of debility, may be accounted for by the same sanguineous degeneration.

The disease of the kidneys just adverted to was first described and recognised as a cause of dropsy by Dr. Bright. He also established the fact, that coagulable urine, that is, urine containing albumen, is a sign of this disease. This subject will be amply discussed under the PATHOLOGY OF THE KIDNEYS; and we now only allude to it for the sake of indicating its connection with the other pathological conditions antecedent to serous effusion. Now it is obvious, that the loss of albumen by the urine might

cause deficiency of this principle in the serum of the blood; and this is found to be actually the case by chemical analysis. The serum has a lower specific gravity, perhaps in consequence of the diminution of the albumen; and this is the very condition that would tend to the production of dropsical effusion. It has been ascertained that a considerable proportion of persons dying of chronic diseases of the viscera, of the chest, and of the abdomen, bear likewise the vestiges of Bright's disease of the kidneys; and it is therefore highly probable, that in many cases, the dropsy which has been attributed to disease of the former, has in reality been owing to the coexistent renal affection. It must be admitted that the vitiation of the blood by the loss of its albumen, though not in a sufficient degree to have alone caused dropsy, might upon the supervention of some of the many causes of congestion which have been adverted to, be quite adequate to produce that result. The converse of this is no less tenable. It must not be forgotten that, although this disease of the kidneys does not necessarily diminish the quantity of urine, yet this result is so common as in itself to account in some measure for the abnormal secretion of serum in other parts.

We have now to consider, as the products of morbid secretion, substances which do not enter into the composition either of the fluids or the solids in their normal state.

Purulent Secretion. The formation of pus is so common a result of inflammation, that, like that of fibrin, it is considered one of the terminations of that lesion. As it will be treated of in this relation elsewhere, we shall now only view it as occurring in parts which have not been the seats of inflammation. Pus may be found in masses of various dimensions in the substance of the lungs, the liver, and other organs, notwithstanding there may have been no symptoms of inflammation in these parts during life, and although the common effects of this process, such as discoloration, softening, and effusion of lymph, are not discoverable in the tissue surrounding the purulent matter. These collections have, therefore, been called purulent deposits, by way of contradistinction to those which are obviously the result of suppurative inflammation. The tissues containing them may be either infiltrated with the purulent matter, by which is meant, that the molecules of the latter are intimately blended with those of the tissue, or the pus may be accumulated in depôts resembling small abscesses, but often differing from these, in the absence of a cyst or of any vestiges of inflammation around them; and hence some pathologists have regarded the extremities of veins as the seat of these deposits. Pus has likewise been seen, according to Andral and others, in coagula within the cavities of the heart, and in the trunks of veins; but Mr. Gulliver is of opinion, that in such instances the matter in question is not pus, but softened fibrin. (*Med. Gaz.*, 1839.) We cannot doubt that this deposition may exist under circumstances which forbid our supposing that the organ in which it is found had been affected with inflammation; but it is still a question, whether its formation may not be traced to an inflammatory process in some other part of the system.

Andral affirms that he has detected purulent spots in coagula of the heart, when there where no traces of suppurative inflammation elsewhere; but Dr. Carswell thinks, that in such cases there has been an error of observation as to the real nature of the supposed purulent matter, and Mr. Gulliver's researches just alluded to are confirmatory of such doubts. Be this as it may, it must be admitted that, in a vast proportion of cases of purulent deposits, inflammation of some organ has preexisted,

and (which is highly important) the veins in the neighbourhood of the latter have been found implicated. This fact affords a ready explanation of the entrance of pus into the general circulation. It has been conjectured that the mixture of pus with the blood causes the changes which we are considering, in two modes. Either the pus is separated without any capillary disorder, as in those cases which present no textural alteration; or, after it has been deposited, it creates irritation in the tissue and suppurative inflammation. Both these views are liable to the objection, that it is highly improbable that globules of pus, considerably larger than those of the blood, should pass through the pulmonary circulation, and be conveyed by the arteries unchanged to the tissue which is their ultimate recipient. The pus, for instance, which has entered a vein from a suppurating wound of the arm or leg, must go the above round before we can find it laid down in the liver, or in the brain, or in the muscles. Another serious objection is, that the deposits are often too abundant to allow of our believing that they were translated from the original seat of suppuration. In some cases they are formed, and very extensively, just when an old suppurative lesion has been removed by amputation. It is true that phlebitis, following the operation, may seem to furnish a source of purulent matter, but whether in a quantity proportionate to the extent of the infiltration is, to say the least, very doubtful. We are rather disposed to conjecture that pus, introduced into the blood, produces a vital change in the constitution of the latter, by virtue of which it is ready to undergo the purulent conversion in any part where the capillary circulation is retarded, but particularly in organs so subject to congestion as the lungs and the liver. When formed the pus may or may not produce inflammation in the surrounding tissue. This view appears to us to harmonise better than any other with the fact, that the introduction of an animal poison into the blood may effect the generation of an indefinite quantity of the same poison, showing that the blood has undergone the same change as in the subject from whom the poison was derived; and in like manner blood, into which pus has entered, may be conceived to be so altered, as readily to generate it, under conditions favourable to the process. Moreover, the symptoms accompanying these deposits are better explained by the notion of a change in the composition and the vital properties of the blood, than of a mere purulent admixture. Such are the derangement of the nervous system indicated by rigors, depression, and stupor, and the vitiated secretion shown by tympanitic distension, fetid breath, dark urine, a peculiar yellowness of skin, and petechiæ.

When the formations occur in one who has long been affected with suppurative disease, and in consequence of an operation which removed that disease, we should be inclined to attribute them to the want of that seat of excretion for the matter to which the system had been habituated. This will be found to have many analogies in other morbid processes, and to fall within the limits of the following general law, viz. that when an organ in which a particular matter had been generated from the blood normally, or for a certain length of time abnormally, is removed or has its action suppressed, the matter will be formed vicariously in some other organ. Thus the arrest of the function of the kidneys is followed by the secretion of urea in other parts; the extirpation of a cancerous tumour, by the accumulation of a similar matter in the viscera.

We believe then that these deposits are the result of an altered condition of the blood, and that this state is nearly always preceded by suppuration in an inflamed tissue. Whether the peculiar depravation can occur independently

of the latter, is perhaps, as yet undetermined; but if reliance may be placed on the cases adduced by Andral and others of the occurrence of purulent spots in the coagula of the heart, although inflammation was no where discoverable, the view which we have offered seems to afford a ready interpretation of such facts.

We have had the satisfaction of perusing a series of interesting memoirs by M. Tessier, on *La Diathèse Purulente*, which he considers to be an altered state of the whole organism, which may be manifested in one of three forms:—1. purulent fever, 2. purulent inflammations; 3. the purulent state, *i. e.* a state characterised by deposits of pus without inflammatory or febrile symptoms.* M. Tessier denies that the disposition to purulent formations is produced by the introduction of pus into the blood, which he maintains is prevented by the coagula or fibrinous concretions in the inflamed veins. It must be confessed that great obscurity hangs over this department of pathology, but from the researches directed to its elucidation, especially those of Mr. Gulliver, M. Mandl, and others (although there are some discrepancies in their microscopic observations), we may hope that, ere long, considerable light will be thrown upon it.

Heterologous Formations. The foregoing diseases may, as we have seen, result from agencies confined to the parts in which they occur, although they often receive their first impulse, and are greatly promoted, by circumstances of a more general operation; but the three following morbid actions, which consist in the secretion of heterologous matters, viz. tubercle, carcinoma, and melanosis, are perhaps never induced by causes strictly local. They imply a fault diffused through the system, or, as it is sometimes designated, a constitutional taint. We shall briefly state some of the grounds on which this opinion rests:—

1. That the formations in question are not of mere local origin, seems to be strongly intimated by the fact, that they are generally met with in several organs at the same time, the organs being of dissimilar structure. Thus, in the same subject we may find tubercle in the lungs, the brain, the lymphatic glands, and other structures no less unlike; carcinoma in the mamma and the bones; melanosis in the eye, the lungs, and the integuments. These facts certainly point to the existence of some pathological condition common to parts which have so little else in common.

2. The removal of the diseased formation from one part is often followed by the development of the same disease in other parts; thus nothing is more common than to find that after the excision of a cancerous breast, the morbid product is deposited in the viscera. The evil is not eradicated, because its existence was not limited to the organ in which it first became manifest.

3. We can by artificial means, which have a purely local operation, induce congestion, inflammation, hæmorrhage, &c.; but for the production of the diseases now under consideration, we must either choose subjects known to have the peculiar tendency, or endeavour to create that tendency, before employing the local agents. This endeavour is only successful in the case of tubercle. We may, by mechanical irritation of the lungs of a rabbit (as by the injection of quicksilver), excite inflammation; but, if we are desirous of seeing tubercles developed, we must select an animal which has been living on improper food, or been subject to some other unwholesome influence.

But presumptions may be offered in favour of the opposite opinion,

* Expérience, Paris, 1838.

viz. that the diseases in question may be independent of any causes but those which belong to the parts affected. Those who hold this view might urge, 1. The predilection of these formations for particular organs, as of tubercle for the lungs, scirrhus for the mamma, &c. We shall not at present enter upon what we consider to be the proper explanation of this fact, but content ourselves with remarking, that it is perfectly reconcilable with the constitutional origin of those diseases. 2. The apparently close connection between the disease and certain external agents, whose operation is manifestly circumscribed, *e. g.* the production of scirrhus by a blow. This proves nothing more than that a local agent may excite disease in an organ which was predisposed, but throws no light upon the mode in which the predisposition was brought about. 3. In certain cases the apparently good health of the individual up to the commencement of the disease. Such cases are very rare, and when they do occur, it will be found that some local cause has occasioned in the part affected a condition favourable both to the production, and to the acceleration of the morbid process. Thus, although a rapid tuberculisation of the lungs may supervene on apparent health, the mischief begins with an attack of pneumonia or of bronchitis, which are highly conducive to the lesion. In the majority of cases there is a marked predisposition in the whole system, recognised by deviations from the normal condition of the organs and functions, and traceable either to original conformation, or to acquired disorder. Such are the strumous habit, tuberculous cachexy, cancerous diathesis, &c. From what has been adduced we may be warranted in concluding, that the morbid growths alluded to are not of local origin; but we may now advance a step further, and attribute the constitutional fault on which they depend to the blood. It is true that blood of a good quality may be sent to an organ, and yet the secretion and nutrition may prove very vitiated, in consequence of some disturbance of those complicated affinities which regulate textural changes; but if the same kind of substance is produced in tissues of very dissimilar organisation, as for instance upon mucous and upon serous surfaces, in the coats of the intestines, and in the substance of the brain, it seems far more probable that the deposit is derived from a common fluid which pervades them all, than that similar derangements should occur in tissues so dissimilar. This *à priori* argument is strongly confirmed by the fact, that the substances in question are occasionally formed in the blood itself, sometimes in the vessels, and sometimes after it has been extravasated. Thus carcinomatous matter is found not only in veins which ramify in the immediate vicinity of tumours, and which might be supposed to have derived it by absorption, but also in remote veins, such as the vena portæ. Since there is a tendency, then, in the particles of the blood itself to assume the forms alluded to, it would be scarcely needful to suppose a derangement in any of the other elements of nutritive and secretory processes, were it not that one part is often more affected that another, though of similar organisation. Thus a tuberculous or scirrhous deposit may be confined to one kidney, or to one hemisphere of the brain. In such cases, perhaps, a temporary congestion might give the first impulse to the diseased action.

We trust it will not be inferred from the above remarks, that we are of opinion that the morbid deposit must have actually preexisted in the blood; our meaning is, that this fluid is so affected in its constitution, as to be ready for the secretion of the matter wherever local conditions are presented. These differ in different tissues, in some (as in secreting parts) they

are normally present ; in others, the nervous and osseous systems for instance, it is probable that morbid congestion is a requisite condition.

There is an important fact upon which some light may be thrown by the preceding remarks, viz. the increased diffusion of the disease, after the removal of an organ in which it had been some time located. An organ which has become the depository (if we may so express it) of the morbid matter, may be regarded as an excretory organ. If the blood is not vitiated to any great extent, the organ may present a sufficient outlet, but the disease of the blood may so accumulate, that deposits are formed in other organs, which is a very common occurrence. The limitation of the disease to one spot will be found to depend either upon the great facility for the formation, as of tubercle in the lungs, or upon the moderate degree in which the blood has been vitiated. In the latter instance the constitutional affection often escapes observation, or is lost sight of amid the disturbance occasioned by the local malady. So much is this the case, that both patients and practitioners have expected a cure by the extirpation of the latter ; but experience has proved that this is nearly always followed by the development of the disease elsewhere. The morbid condition of the blood remains, though the deposit has been removed ; and the excretion no longer taking place as heretofore, the disease of the blood after a time is so much increased, that parts which otherwise might have escaped, are forced to become the new depositories of the morbid product. For the effect alluded to it is not necessary that the diseased part should be removed — the arrest of the morbid secretion is sufficient. Thus the growth of carcinoma of the breast has been stopped by compression; but this apparent suppression of the malady has been followed by a more deadly invasion of internal organs. The rationale of the process appears precisely similar to that of purulent formations ensuing upon the removal of an extensive suppurating tissue. In both cases we may discern an analogy to the accumulation of normal secretions in the blood, and their vicarious deposition in anomalous localities, when the function of the proper organs has been extinguished. We must, however, admit that, in some rare instances, the removal of the local evil appears to be a radical cure ; yet it must not be hence inferred that no fault existed in the constitution, for the latter may have subsided; in other words, the blood, though once sufficiently depraved to have caused the formation in question, may have improved in its composition. In this manner we may account for the long duration of organic diseases, when the local disorder did not, either by its extent or its locality, involve the more specially vital functions.

Tuberculous Secretion. The name *tubercle*, once used to distinguish the form and size of tumours, without reference to their composition, is now appropriated to a morbid substance deposited upon the surface of membranes, or in the texture of organs. It varies in colour and in consistence; but there are two principal varieties, — in one it is whitish-grey, semitransparent, and dense ; in the other it is yellow, opake, and somewhat friable. They might be compared respectively to solidified lymph and pus, if the latter ever existed in a concrete form. The semitransparent may be transmuted into the opaque variety, but we have no evidence that the converse of this ever takes place. Laennec and Louis have held them to be only different phases of the same matter, and that the opake must have been once transparent; but for this view no adequate reasons have been adduced. The grey tubercle is seen in single or aggregated cells of the lungs (constituting the miliary granulations of Bayle and Laennec), and upon serous membranes.

Upon the pleura and peritoneum it forms little pearly excrescences, or semi-transparent patches. The yellow tubercle is found in similar situations; it is more common than the other, and occurs, or at least is recognised, in a greater number and variety of organs, as for instance in lymphatic glands, in the intestines, in the spleen, the liver, the brain, &c. The tuberculous matter may be collected into nodules, or dispersed through the substance of organs, or spread loosely in the form of homogeneous cheesy matter on mucous membranes — the latter appearance is well seen in the Fallopian tubes and in the uterus. The form which either kind presents is an accident depending upon its situation and quantity.

Chemical analysis resolves tubercle into albumen, fibrin, gelatin, salts of soda and lime, and water ; but this statement applies to the opake deposit. From the above facts it will be evident that the physical qualities of tubercle are not so characteristic as to enable us at once to recognise it, without taking into consideration certain collateral proofs derived from its location, the changes which it undergoes, and the condition of the general system.

The most frequent alteration observable in this matter is its softening. In the different stages of this process it becomes pulpy, semiliquid, a fluid closely resembling pus, or a mixture of small granules or flakes (called curdly or cheesy) with a thin liquid. Very frequently it is mingled with serum, pus, blood, or the peculiar secretion of the part, such as mucus ; and, in that state, we are unable to say with precision what part, or whether any, of the mixture is tuberculous. But tubercle may be changed into the opposite condition of hardness. When this takes place the liquid particles are absorbed, and leave behind them but a small quantity of animal matter with earthy particles, presenting the consistence of putty, or of hard calcareous matter. The latter has been designated the cretaceous transformation.

It has been much disputed whether tubercle is an organised substance. We may safely declare that the yellow opake matter has no title whatever to be so considered. With regard to the grey tubercle, which resembles in many respects the appearance of organised lymph, there is somewhat more reason to doubt. It has no vessels, for those which sometimes appear to traverse it, belong really to the tissue in which the tubercle is deposited ; its molecular arrangement is neither cellular nor fibrous ; and it exhibits no action of a vital character. All these negative circumstances may be alleged against a fibrinous effusion. But there is one important difference between the two products, namely, that the latter may become organised, may have vessels developed in it, and in fact become a tissue, but no such transformation can happen to tubercle.* The only changes of this substance attributed to the action of its intrinsic properties, even by those who have held it to be an accidental tissue, are its supposed growth by intus-ception, its maturation into opake matter, its softening in the centre, and its liquefaction.

The formation of tubercle takes place by a mechanism as simple as that of serous and fibrinous secretion, but it implies, as we have stated, an alteration in the blood itself. That change having occurred, the same disorder in the capillary circulation which otherwise might have led to the effusion of serum, pus, and blood, may cause the secretion of tubercle. Or perhaps, without such disorder, there may be simply a deposition of this morbid substance in place of the normal secretion, whether nutritive or perspirable. It may either exude from the capillaries, or it may separate itself from blood coagulated in the vessels or extravasated. In some cases, as we have seen,

* In other words, a fibrinous effusion is a tissue *potentially*, which cannot be said of tubercle.

it occurs at once in its most concentrated form of opake yellow tubercle; in others it has the appearance of lymph (semitransparent grey tubercle), but of lymph depraved and insusceptible of organisation. It is, however, not unfrequently mixed with healthy plastic lymph ; thus we find, in what is called tubercular peritonitis, little dots and patches of opake inorganised matter embedded in fibrinous membranes.

Exuding from the vessels, it must, of course, be liquid, but it afterwards becomes concrete, most probably by something like coagulation, and may remain so for an indefinite time. The softening to which it is subject is in many cases owing to, and in all perhaps greatly promoted by, the effusion of serum or pus around it; but we see no reason why it should not soften by virtue of changes peculiar to itself. This process appears to begin occasionally in the centre. Laennec thought it always did; but the central drop of fluid which is so common in pulmonary tubercle, and which gave rise to that opinion, has been attributed by Dr. Carswell to the isolation of a portion of the secretion of the air-cell or tube, during the formation of the tubercle. May it not be accounted for as a serosity separated from the solid matter of the tubercle during the concrescence of the latter ?

Much difference of opinion has existed as to the inflammatory origin of tubercle, some maintaining that phlogistic action is essential, others denying that this process has any thing to do with tubercular formations. From what has been stated there can, we submit, be little doubt that inflammation presents one of the most favourable local conditions for the disease, but that it must have been preceded by a constitutional affection before it is capable of producing tubercle. The inflammation is for the most part chronic, though occasionally we meet with tubercle as the product of the acute form. The deposit is then usually mingled with the common results of inflammation, viz. serum, lymph, and pus.

The constitutional affection is of the last importance in a prophylactic point of view. It has been named by Sir James Clark the *tuberculous cachexy*. This includes both the connate predisposition and that which is acquired. The former corresponds to the scrofulous or strumous habit. Its physiological characters are either a fair transparent complexion with light eyes and hair, or a dark muddy complexion with hazel eyes and black hair. The pathological indications are a projecting forehead, tumid upper lip, narrow or flattened thorax, protuberant abdomen, enlarged or indurated lymphatic glands, congested tonsils, &c. Such subjects often grow rapidly, but the quick development is at the expense of the quality of the tissues. When they are affected with external inflammation, the morbid condition of the blood is indicated by its products; in the suppurative process the matter is thin and curdly; in the healing process the tardy or fungous granulations indicate the effusion of a matter, either little susceptible of organisation, or running into a rank degenerate growth.

The acquired cachexy is not recognised by the same characters; its existence is inferred from the long-continued disorder of certain functions, particularly digestion and excretion, and from the production of tuberculous matter. The latter occurs more rarely on the surface of the body than in the congenital habit. But whether the matter is called tuberculous, scrofulous, or strumous, it implies an imperfectly organisable or absolutely non-plastic matter secreted from unhealthy blood. The circumstances which produce the acquired diathesis encourage the connate. Some of these act by withdrawing or diminishing the stimuli of life; such are deficient or innutritious aliment, and dark ill-ventilated habitations: others derange the assimilative process; such are the long-continued use of food

either too stimulating or difficult of digestion, and sedentary habits: others interfere with the excretions; for instance, neglect of exercise, inattention to the bowels, and to the function of the skin: others again, less or more directly, lower the powers of life; such are the depressing emotions, evacuations by hæmorrhage, or discharges from the mucous surfaces, exposure to cold and moisture, &c. The operation of most of these causes will be found to influence the state of the blood either by an imperfect sanguifaction, or by the retention of matters which ought to be eliminated.

All ages are liable to tuberculous formations, but the extremes of life less than intermediate periods. The disease is very rare in the fœtus, nor is it common before the fourth year. Between the fourth and fifth years its frequency is very great; but this diminishes until puberty, between which epoch and the age of fifty it is greatest.

Of all the organs the lungs are most subject to tubercles. After fifteen M. Louis is of opinion that tubercle is never found in any part of the body without the lungs also being implicated. This is the general rule, but there are exceptions, and the most frequent, according to Dr. Carswell, is the occurrence of tubercle in the peritoneum without any pulmonary complication. Our own experience corroborates the latter statement. In young children, the mesenteric and bronchial glands are the most common participants with the lungs; in adults, the follicles of the small intestines; while in boyhood, the extremities of the long bones are the most frequent seats of the disease.

Tubercle disorganises the tissue in which it is deposited, by attracting blood unduly, and by the consequent inflammation and suppuration; it also interrupts the circulation by compressing the capillaries, the veins, and the arteries, and thereby causing respectively atrophy, hæmorrhage, and gangrene.

Carcinomatous Secretion. Carcinoma originally signified a malignant ulcer, which was fancied to bear some resemblance to a crab (καρκίνος); but as the Latin synonym, *cancer*, implies the same thing, the former term can be very well-spared for the use which is generally made of it now, to designate a class of morbid formations, which have for their common base a peculiar matter generated in a peculiar diathesis. Many of these have been described as specific independent diseases; but that they are intimately allied, is proved by the facts that they occur contemporaneously in the same individual, nay, in the same organ; that they originate in the same state of the system, and show a remarkable tendency to destroy the tissues in which they are located. But, for these circumstances, their form, colour, density, and other physical, as well as their vital, qualities differ so considerably, that we might be led to consider them as having nothing in common.

The following are the chief carcinomatous diseases described by authors. *Scirrhus*, a dense substance intersected with lines of cellular membrane, giving it a fibrous appearance. *Mammary sarcoma*, a substance resembling boiled udder. *Pancreatic sarcoma*, distinguished by its lobular arrangement. *Lardaceous matter*, white, homogeneous, varying in consistence, from that of softish cartilage to that of pork fat. *Matière colloide*, of Laennec, glue-like, corresponding to the *gelatiniform* or *areolar cancer* of Cruveilhier, in which the matter is collected in the meshes of cellular tissue. *Vascular sarcoma*, red and fleshy, like organised lymph. *Encephaloid matter*, pulpy and brain-like, otherwise called *medullary sarcoma*. *Fungus hœmatodes* and *fungoid disease* are advanced stages of the last mentioned formation, and characterised by great vascularity and tendency to bleed.

Dr. Carswell, who has given a very clear and satisfactory account of these formations, divides carcinoma into two species, scirrhoma and cephaloma. "The first is that in which this deposit has little or no tendency to become organised. Its form and arrangement appear to be determined chiefly by external circumstances; and its formation and subsequent increase are entirely dependent on the nutritive function of the organ in which it is contained. In the second state this deposit exhibits, on the contrary, a greater or less tendency to become organised. Although it may at first assume a determinate form and arrangement, in consequence of the influence of external circumstances, it possesses in itself properties by means of which its subsequent arrangement and development are effected, independent of the nutritive function of the organ in which it is formed, except in so far as the materials of its growth may be derived from this source."*

The varieties of scirrhoma are scirrhous pancreatic sarcoma, tissu lardace, matière colloide, cancer gelatiniforme. The varieties of cephaloma are vascular sarcoma, mammary sarcoma, and medullary sarcoma.

The form, bulk, and consistence which carcinomatous matter assumes, depend partly upon the nature of the tissue in which it is secreted, and partly upon the degree and the direction of the pressure to which it is subjected; but the nature of the morbid deposit itself has likewise much to do with the arrangement. Thus in the same organ, as in the submucous membrane of the stomach, it is presented in the very different forms of dense and fibriform scirrhus, and of the softest medullary vegetations.

The deposit sometimes imitates the appearance of dense, hypertrophied, cellular membrane, as in the submucous and subcutaneous tissues. Hence Andral is very jealous of applying a term so specific as scirrhus to many of these formations. In some parts it appears to take the place of the proper textural molecules, as in the lobules of the liver and in the muscular fibres of the stomach. There is, however, a difference of opinion on this subject; some observers maintaining that the matter is deposited, even in these cases, in the cellular membrane, not by substitution for the proper molecules. In other parts it has the appearance of a new growth engrafted on that of the organ; in others it is intimately mixed up with the textural molecules; and in others, again, it appears to have monopolised all the nutriment sent to the normal tissue, which has in consequence disappeared before it, and of which it has taken the mould. We have found nearly the whole substance of the kidney, or of one lung, transformed into a mass of medullary matter. It is therefore evident, that the anatomical structure of carcinomatous formations must be in some cases partly composed of that which is proper to the organs affected, and partly of what belongs to the new growth; but in other cases it is altogether of the latter description, and, as such, may contain cellular membrane, fibrous tissue, and bloodvessels.

The anatomical structure of carcinomatous, as of the other heterologous formations, has been investigated with great acuteness and industry, and in a truly philosophical spirit, by Dr. Hodgkin. It is his opinion that they have always more or less of a compound cystiform arrangement; that, in fact, the adventitious growth consists of a bundle of cysts, varying in their solid and fluid contents, growing from broad bases, or far more commonly by peduncles springing from a small spot (whence the radiated appearance

* Illustrations of the Elementary Forms of Disease. By Robert Carswell, M.D. &c. &c. fasc. ii.

of the septa), and enveloped by a large cyst or sac, which bears to the secondary cysts the same relation as the pericardium or the peritoneum to their respective viscera. The secondary cysts may burst their parent envelope, and, freed from the restraint, grow more luxuriantly; or they may be so compressed, either by reason of their number, or by the density of the surrounding tissues, as either to die in a short time and become gangrenous matter, which communicates sooner or later with an external ulcer, or to be gradually converted into a dense fibriform tissue. These changes may, therefore, greatly obscure the original structure. The adjoining tissues undergo inflammation, softening, suppuration, ulceration, hypertrophy, induration, &c. and thus increase the difficulties of unravelling the essential growth. It remains to be seen whether these observations will be confirmed by other morbid anatomists. Dr. Hodgkin seems to think that the true arrangement has escaped previous notice, partly from the circumstance that the tumours in question are generally examined by incisions through the body of the disease, instead of by dissection in laminæ from the surface, and partly from the confusion of the parts, occasioned by steeping them in spirit. From the latter difficulty Dr. Hodgkin has not been able to preserve any preparations exhibiting the appearances which he has described. As the limits of this introduction do not admit of a more extended view of Dr. Hodgkin's opinions, we beg to refer for more detailed information to his valuable lectures on the serous membranes, and to his paper published in the *Med. Chir. Soc. Trans.*, vol. xv. We shall only add, that although the true anatomy of these structures must be settled by actual examination, yet there appears to us to be a strong argument by analogy for Dr. Hodgkin's view, viz. that the cellular origin and arrangement observable in the simpler organised formations, as well in the animal as in the vegetable kingdom, might be reasonably looked for in the degenerate or parasitic growths of the higher organisms. This view neither impugns, nor is it itself impugned by, the view which has been taken of the constitutional origin of the disease; because the cysts may contain healthy or malignant products according to the composition of the blood.

We have already adduced reasons for the opinion that carcinoma, like the other heterologous formations, is a product of diseased blood. As this fluid in the healthy state may when it is coagulated (either within its vessels or after extravasation) be organised into an analogous tissue, or may yield lymph which transudes the capillary vessels, and undergoes a like transformation, so, when diseased, it may either by direct conversion or by secretion originate a heterologous tissue. We far more frequently meet with the formation as the result of secretion; but the former mode is not uncommon in carcinomatous subjects. The blood is found thus changed in the veins of the kidney and the liver. Not long ago, when examining an encephaloid kidney, we found inclosed in a cyst which had probably been one of the calyces, a coagulum of blood, showing in a striking manner the degenerate conversion. One part of it was a firm crimson clot; continuous with this was a portion of decolorised semi-transparent fibrin, which shaded off insensibly into a mass of yellow opake pulpy matter corresponding exactly with the cerebriform structure of the kidney.

The immediate impulse to the morbid secretion is commonly, perhaps always, given by a change in the local capillary circulation; which may be inflammation, but far more frequently is congestion only. The parts most liable to carcinoma are those which are either exposed by their situation to slight accidental injuries, or by their function to variations in the supply

of blood. To the former category belong the integuments, the œsophagus, and the organs of locomotion; to the latter the uterus, stomach, liver, kidney, and testicle. The mamma, from its situation and function, belongs to both, whence perhaps the frequency of the disease in this part. The morbid deposit is met with especially in those parts of organs where follicles abound, as in the os and cervix uteri, and the pylorus. The mamma, liver, kidney, and testicles, being agglomerations of follicles, are in the same predicament.

It is interesting to observe, that the specialty of the formation is affected by the secretion of the neighbouring part, a fact to which Dr. Hodgkin has particularly adverted. Thus the *gum cancer* is found in the pyloric extremity of the stomach and in the cervix uteri, both which situations yield, in the normal condition, a large quantity of mucus. The bony and cartilaginous nature of carcinoma growing from the periosteum is another illustration. Inflammation is more frequently the concomitant than the precursor of carcinomatous secretion. As in the case of tubercle, the deposit may either act as a foreign body, and attract blood to the part, or so interfere with the venous circulation as to induce stagnation. Inflammation of a slow kind may lead to induration, or, if more active, to softening and suppuration. The combined effect of the accumulation of the morbid secretion, and of the thickening of the tissues around it, is often such a compression of the bloodvessels, that mortification and sloughing ensue. This may happen first upon the exterior, and afterwards in the deeper-seated parts; or the latter may have been first affected in this manner, so that when the superficial ulceration takes place, a communication is effected with the interior. The edges of the ulcer are generally everted by the deposit in the subcutaneous tissue; but they may be turned inwards when a cavity exists below, of larger dimensions than the external ulcer. This process belongs especially to scirrhus. The fluid exuding from such a surface is thin, or sanious, and so utterly unlike the pus of healthy inflammation as to indicate the altered condition of the blood.

Carcinoma may be fatal in a variety of modes,—sometimes suddenly by hæmorrhage, which may result from the ulceration of a large arterial trunk, or from the giving way of the loose vessels of the fungoid tissue itself. The latter may be aided by venous obstruction in the collateral circulation. The hæmorrhage, without inducing fatal syncope at any one time, may recur so often as rapidly to exhaust a frame already debilitated. This is very commonly the mode in which the sufferings of a patient with carcinoma of the uterus are terminated. The other discharges accompanying the disease likewise tend to a gradual decay of power. But the mere impediment to the function of one or more affected organs may be enough to extinguish life. This is most obvious in the brain, but scarcely less so, though by a more gradual process, in the lungs, the œsophagus, the stomach, and the rectum. When the disease is seated in the extremities, death may in some cases be the effect of long-continued irritation; in others, of its extension to the internal viscera; and, not unfrequently, of the operation intended to remove it. When there is no absolute impediment to the functions essential to life, the sufferings are sometimes dreadfully prolonged. This happens to the female more frequently than to the male. Thus carcinoma of the uterus may extend to the adjoining viscera, making one frightful cavity of the bladder, vagina, and rectum, analogous to the cloaca of a lower organism; and the patient may at last be indebted to hæmorrhage for her release.

The duration of this disease is longer, for the most part, in the species of which scirrhus is the type, than in the softer and more vascular forms.

Independently of the fact, that in the latter a greater number of organs are affected, their activity of growth renders them more destructive to the tissues which they invade. Something also depends upon the age of the subject; for while the cephalomatous formations are not uncommon in young persons, the scirrhous and its kindred forms are confined to persons who have passed the middle age. In the former class of subjects all morbid formations run their course more rapidly, in accordance with the activity of the organic functions.

The signs of the *cancerous diathesis* are often later in their development than those of the tuberculous cachexy. When fully developed, however, they are very characteristic. The complexion has a pale lemon tinge, the eye is lustreless, and the expression of the countenance sad; these signs are often combined with emaciation, disordered digestion, and languor both of body and mind. We have noticed the peculiarity of the complexion in persons who have inherited the diathesis, long before any local disease has manifested itself. But more commonly these constitutional indications only attract notice after the symptoms have made their appearance, which is scarcely wonderful, since the general indications, like the local malady, are but the effects of a cause common to both, viz. the morbid condition of the blood. It is however the opinion of some pathologists, that the system is affected subsequently to the morbid growth, by means of absorption of the diseased matter. This opinion appears to us to rest upon very slight foundations. The strongest fact in its favour is the disease of the absorbent glands in the vicinity of the formation; but this often consists in mere enlargement and induration, such as may occur in the neighbourhood of inflamed organs; and when the glands really contain carcinomatous matter, its presence is more easily referred to secretion in those bodies which have been previously congested, than to accumulation by absorption. Few would be disposed to admit that the tuberculous infiltration of the bronchial glands is the effect of absorption from the diseased lungs; yet their relation to the latter is precisely analogous to that of the indurated axillary glands to carcinoma of the breast.

It is not always easy to determine, whether a morbid formation is of a malignant nature.* If we take into account the constitutional symptoms, and recognise the existence of the disease in other organs, the difficulty is but slight; but if the part is isolated, we can only form our conclusion during life: 1. from the character of the pain, which is generally lancinating and subject to nightly aggravations; 2. from the form of the ulcer; 3. from the intractability of the disease; 4. from the enlargement of the adjoining veins. None of these signs can be relied upon singly, but their combined evidence is strong. In the dead subject difficulty may also arise from the absence of similar disease in distant organs. But we must in such cases depend upon a very careful dissection of the part; and if it should appear that the contiguous textures have been assimilated to the morbid growth, so as to present one homogeneous mass, we shall seldom err in asserting its malignant character. The doubtful character of ulcers with indurated edges in the stomach, consequent upon chronic gastritis, and of thickening and hardening of the rectum, will exemplify the difficulty in question.† Dr. Hodgkin considers that some trace, however slight, of the cystiform arrangement before alluded to, is a *sine quâ non* to malignancy.

* The term malignant is applied to carcinomatous and melanotic diseases. It was doubtless suggested by their intractable and destructive character.

† It is curious to observe the complete *fusion* of the most dissimilar parts; bone, periosteum, aponeurosis, muscle, and cellular membrane, all converted into one substance. Some years ago

Carcinoma is not readily confounded with tubercle, 1st, because of its tendency to organisation, which is wanting in the latter; 2dly, because those species of carcinoma which are of a less organisable character have a greater density than is found in tubercle, possess more or less of a fibriform arrangement, and present a different series of changes in the adjoining parts. The colour will often assist the judgment. Thus the lardaceous matter in its consistence, its want of distinct organisation, and its process of softening, might be confounded with tuberculous infiltration, but the brilliant white of the former is enough to distinguish it from the latter, which inclines more or less to a yellowish grey.

Melanotic Secretion. The matter which gives the character to melanosis is an unorganised product, inclining from dark brown, or a dull bistre, or sooty colour, to black; but it is never completely black in the human subject. It may be collected in masses with or without cysts, or in diffused patches on the surface of membranes. Sometimes it appears infiltrated in the form of dots; and occasionally it has been found liquid, in natural or accidental cavities. The first of these forms is the most characteristic, and the least likely to be confounded with discolorations depending on other causes. Melanotic matter has a considerable resemblance to the pigment of the choroid, and to that of the skin in the dark races of man. Andral mentions the curious fact respecting horses (in which animals the disease is very common), that the white and grey varieties are most frequently affected; whence it might be inferred, that melanosis is a sort of metastatic secretion of the colouring matter of the skin.

Melanosis attacks the liver more frequently than other organs; but the eye, the skin, the brain, the lungs, the kidneys, and other glandular organs, are occasionally the seats of the deposit. It is very seldom found in one organ only. It deserves the character of "malignant," both from the destruction of the tissues, which it sooner or later occasions, and from the depraved habit in which it originates.

The melanotic pigment is often intermixed with carcinomatous matter. Hence it has been called *cancer noire* or *mélanique*. Cruveilhier has given an excellent representation of this form occurring in the hand, and to Dr. Carswell we owe a beautiful delineation of this formation in the brain, in which the pigment was deposited in tumours of a structure somewhat intermediate to erectile tissue and fungoid disease. But the eye is most frequently the seat of this associated disease; a fact exemplifying the principle already stated, that the specialty of a morbid product is often determined by the normal secretion of the part.

Chemical analysis has discovered in melanotic deposits, besides albumen, fibrin, and the salts usually found in blood, a substance very similar to, but not identical with, the colouring matter of the blood: it contains a large proportion of carbon. The retention of this in the blood appears to be favoured by venous stagnation, and to be met with in persons of the melancholic or venous temperament. The latter fact corresponds with its greater frequency in aged subjects. Dr. Carswell states that he has discovered the black deposit in the minute veins of the liver. It must require a very practised eye to distinguish it in this situation from dark venous blood. But without the help of this fact, we may readily infer, from the composition of the matter, that it is a deposit from altered blood; and the diffusion of

we published in the *N. of Eng. Med. and Surg. Journ.* 1830, a remarkable case, in which a lardaceous formation occupied the greater part of the right lung, and was traced upwards under the clavicle in continuity with a large tumour in the neck. We called it encephaloid at that time, but *lardaceous* would have been a more appropriate term.

it through several organs at the same time shows that the vitiation of the fluid is not partial.

The changes of the deposit are inseparable from those of the surrounding tissue, in which the matter operating by irritation, compression, and obstruction, induces softening, gangrene, ulceration, &c.

The disease is rare in the human subject; but as other discolorations have been confounded with it, we must briefly notice one or two of these.

The mucous membranes often present a black hue, in points, or in arborescent lines, which is occasioned by the stagnation of the blood in the small vessels. The serum, containing the salts which impart the florid colour, has in these cases separated from the cruor, the colouring matter of which may become black merely from this circumstance, as we may observe in coagula of the heart. But independently of this cause, blood stagnating in the mucous membrane of the alimentary canal is subject to many chemical agents which may blacken it; such are the gastric acid, the cæcal acid, and sulphuretted hydrogen. This fact must always be taken into account in estimating the shades of redness. Thus when bright red spots in the villous coat of the cæcum have presented themselves, we have found, by applying test-paper, that sufficient bilious secretion existed in the part to neutralise the acid formed in it. In the serous membranes, particularly the peritoneum, we not unfrequently observe similar discolorations accompanying tuberculous and inflammatory deposits. Some of these are bright black dots, the result of stagnation in the minute vessels; others are patches of greater extent and of more recent formation, produced by the alteration of blood passively congested, and in some cases extravasated. In these instances Dr. Carswell has pointed out the effect of sulphuretted hydrogen penetrating the parietes of the intestine.

In the lungs we very commonly see spots and patches of black matter, particularly in the *induration noire* of some authors, which may be traced to coagulation and retention of blood in the vessels. But this must not be confounded with a discoloration of much more rare occurrence, caused by the accumulation of carbonaceous matter in the bronchial ramifications, the matter having been received from without. It has been detected in the lungs of coal-miners, and was first recognised by Drs. Gregory and Christison. It is possible that in these cases the retention of the matter is favoured by a morbid condition of the membrane or of its mucous secretion.

Gaseous Secretion. The presence of air in certain cavities, natural or accidental, gives rise to the question whether it was introduced from without, or evolved from solid and fluid matters, during decomposition, or formed directly from the blood by a true morbid process? Of the two former modes there are indisputable examples, the latter is somewhat more questionable; but we shall adduce reasons for receiving this also.

The anomalous presence of atmospheric air is instanced in emphysema of the cellular tissue, produced by wounds or by ulcerations, which open a communication between the air-passages and the cellular tissue ; in pneumothorax, or air collected in the pleural cavity, through a fistulous opening or the bronchiæ or of the parietes of the chest; and in the fatal accident of the introduction of air into large venous trunks, during surgical operations at the summit of the thorax. Of the second mode we have instances in the vesicles of gangrenous tissues, in many of the gaseous accumulations of the stomach and intestines, and perhaps also in the peritoneum, from decomposition of its fluid contents.

The morbid production of gas from the blood is what particularly belongs to the present section. The arguments in favour of such a process are as

follow : — 1. The analogy derived from normal functions. Carbonic acid is exhaled from the bronchial membrane and from the skin; air is secreted in the swimming bladder of fishes, and the different divisions of the alimentary tube have their proper gases, which must be referred to direct secretion rather than to evolution from particles of food, since their determinate nature is scarcely compatible with the variable composition of the latter. 2. Large quantities of gas are suddenly accumulated in the stomach and the intestines, under the influence of mental emotions. 3. Hypochondriacal, hysterical, and gouty subjects, are liable to gaseous eructations, borborygmi, meteorism, and flatulent colic, irrespectively of any particular articles of diet, and often in connection with, or vicariously of, morbid fluid secretions. 4. A portion of intestine in a living animal was emptied by Magendie, then tied at its extremities and returned into the abdomen; after some hours it was found distended with gas. 5. Air has been discovered in the gall-bladder, the urinary bladder, and more frequently in the uterus. We may upon these grounds admit the secretion of gaseous matter as a fact. The mode in which it takes place is unknown; it may be conjectured to arise from a disturbance of the chemico-vital attractions, the immediate agent of which would appear in many cases to be a disordered innervation operating upon the blood.

III. DISEASED NUTRITION.

Hypertrophy. This very common disease consists in an inordinate secretion of textural matter. Its origin may sometimes be traced from the very beginning of extra-uterine life, and depends upon a faulty development of the system, the normal proportions between the organs not having been preserved. Thus the liver sometimes maintains its fœtal volume, while the growth of other organs is disproportionately small. Others, as the thymus and the suprarenal capsules, which should all but disappear, continue developed beyond the proper time. But more frequently hypertrophy is produced by pathological conditions, which may arise at any period of existence.

An excessive quantity of blood is an obvious source of hypertrophy; but as we can seldom trace this condition in all the tissues, its appearance in particular parts must depend upon local agents. The tissue most affected by this general cause is the adipose, which seems indeed, besides its other uses, to be a kind of natural depository for superfluous nutriment. While plethora in one person may dispose to inflammation, in a second to hæmorrhage, in a third to dropsy, it may in a fourth induce obesity. Obesity, thus effected, may be removed by depletion and a slender diet; but in some this state is so habitual as to have assumed a normal character; and, when this is the case, the blood may not be more than adequate to its maintenance. It is an old remark, that fat persons are not good subjects for bloodletting; and the fact is perhaps in part accounted for by the greater demand which is made upon the blood by the excessive adipose growth. Something may be owing to the state of the heart in such persons, which is not unfrequently loaded with fat at the same time that its muscular fibres are wanting in tone and firmness.

But the blood may be neither excessive in quantity nor rich in its composition, and may still produce hypertrophy in certain tissues. In scrofulous subjects there is frequently an undue development of the cartilages, the lymphatic glands, and the brain; and it may be suspected that the blood yields the requisite principles for the nourishment of these white tissues

in abundance, though it is deficient in fibrin. To a similar cause, that is, a composition of the blood favourable to the nutrition of particular tissues, we may perhaps ascribe the hypertrophy already noticed as a continuance of the fœtal condition. A highly fibrinous state of the blood is particularly adapted to hypertrophy of the muscles, and the production of the former is aimed at in the diet of the athletic.

The local causes of hypertrophy all concur in determining more blood to the capillaries. We should have scarcely expected that passive congestion, especially that which results from venous obstruction, would be followed by excessive nutrition, for the obvious reason that the increased quantity of blood is owing to retention, and not to a greater supply from the arteries; but the researches of Dr. Clendinning, as to the absolute and relative weight of the viscera in cardiac diseases and in phthisis, are unfavourable to this *à priori* conclusion. (*Med. Chir. Trans.* vol. xxi.; and *Gulstonian Lectures, Med. Gaz.* 1838.) One of the most frequent causes is the increased exercise of the part affected, which always attracts a proportionate quantity of the circulating fluid. The disproportionate growth of particular sets of muscles (as in the arms of a boatman, and in the legs of an opera-dancer) illustrates hypertrophy from this cause. The same fact is observable in the muscles of organic life, in the heart, the fibres of the stomach, and those of the bladder. In the last mentioned viscus the fibres are sometimes so strongly developed, as to present a reticulated or honeycomb appearance. In all these organs the greater action may be induced by an increase in the quantity or in the stimulating property of their contents, or by an obstruction to the egress of the latter, as in valvular contractions, narrowing of the pylorus, and stricture of the urethra. The obstruction only operates, perhaps, by subjecting the fibres for a longer time to the action of their proper stimuli. Hypertrophy, thus induced, is accompanied by dilatation. Secreting organs are subject to hypertrophy from increase of function, as exemplified by the enlargement of the testes and mammæ under such circumstances, and by that of the liver in hot climates.

Chronic inflammation frequently numbers hypertrophy in its train of evils. The mucous membranes afford a host of illustrations, whether in the true villous coat, or in the follicles, or in the submucous cellular tissue. Thickenings, excrescences, and vegetations, encroach on their cavities, and produce the most serious results, especially in narrow passages, as in the glottis, the lachrymal duct, the bronchiæ, the urethra, and the vagina. The inflamed state of these membranes causes hypertrophy by irritation of the adjoining muscular fibres, without any obstruction. In chronic gastritis the muscular coat may be thickened without any enlargement of the viscus, and a similar condition is noticed in chronic inflammation of the bladder. Numberless examples of the present lesion resulting from inflammation might be quoted from the pathology of the lymphatic system, the glandular organs, and the nervous tissue.

Does hypertrophy ever depend on a deficiency of textural absorption and the consequent predominance of deposition? This remains to be proved.

The hypertrophy of an organ must not be determined by mere volume; for this is often fallacious, partly from the molecules being aggregated more loosely, and partly from the difficulty of estimating in hollow organs the due proportion of the parietes to the cavity. The increased weight is a much safer criterion, and must be estimated by comparison with the weight of the whole body.

Atrophy. This, which is the opposite of the disease last mentioned, we

meet with as a physiological action in the structural decay of old age. In no organs is it better exemplified than in bones, of which we find the cancelli larger, the compact tissue thinner, and the whole weight remarkably diminished. A general deficiency of the circulating fluid lessens the nutrition of some tissues and organs more than of others. The adipose substance is the first to suffer, for a reason easily apprehended after what was said of its hypertrophy. The muscles of relative life being highly animalised are soon affected by deterioration of the blood, whether this depends upon insufficient food, or upon disease of the digestive organs, of the lacteal system, or of any part of the apparatus of sanguifaction. The emaciation of fever is a compound result of the alteration in the circulating fluid and of its brief sojourn in the tissues. Persons with habitually quick pulses are never fat.

All local causes of atrophy act through the intervention of local anæmia. Diminished exercise of the organ causes diminished afflux of blood. Instances of this mode of production may be found in the shrunken ovaries and mammæ of virginity; in the contracted portion of intestine below an artificial anus; in the lung impeded in its function by pleuritic effusion, or by a compressed bronchus. To this head we must refer the wasting of muscles by disuse in paralytics and other bedridden persons. We do not think that any sufficient proof has been adduced of impaired or suspended innervation acting in any other way than by the disuse of the muscles, and by the diminished attraction of blood consequent upon the latter.

Arterial obstruction may induce atrophy; but for this effect it must be very gradual. If the tissue is not accommodated by degrees to the lessened supply of blood, its death, instead of wasting, may be the result. Compression of the capillaries is a more frequent cause, as may be seen in the effect of bandaging. Thus mendicants are in the habit of binding the limbs of their miserable children in order to prevent their growth, and, by the exhibition, to extort alms; and the Chinese women adopt the same physical principle in the production of small feet. Tubercles in the lungs occasion atrophy of the pulmonary substance, and the pressure of confined air in emphysema of the lungs may have a similar effect.

Atrophy may be conjoined either with dilatation or with contraction of an organ. Before deciding upon its existence, therefore, we must have proof of diminished weight. Paleness generally accompanies atrophy, as might be expected from the state of the circulation which precedes the latter.

Softening. Under this term are included many pathological alterations in which the tissues lose their natural consistence, but which cannot be all referred to a derangement of nutritive secretion. We have already seen that softening is a consequence of hæmorrhage, œdema, suppuration, and of those changes to which the heterologous deposits are liable; that, in fact, the density of the tissue is impaired by external agency, not by any intrinsic process. The fluid effused appears, in most of these cases, not only to break down the structure by infiltration, but also by its pressure to impede the nutritive deposition. But when softening presents itself as a true perversion of nutrition, we find the tissue in one of two states,—either those molecules are deficient which impart the usual degree of firmness; or, when the tissue is less composite, the true molecules are softer than natural. The former is illustrated in the bones of rachitic patients, the latter in the cerebral ramollissement of aged subjects.

Softening, considered as a disease of nutrition, is far less common than that which results from inflammation or the other lesions just adverted to;

but when it does occur, it is seldom restricted to one organ. The parts affected appear to share a fault which pervades the whole system. Thus in weakly ill-nourished infants, in scrofulous and scorbutic patients, we find all the structures more or less involved, the skin flaccid, the cellular membrane loose, the capillaries easily ruptured, the muscles pale and flabby, the cartilages tender, and the bones brittle or semi-flexile. With these changes in the tissues there is a corresponding depravation of the blood, which is thin, serous, and feebly plastic. Perhaps the best example of circumscribed softening from deranged nutrition is that which occurs in the brain, as the result of partial obstruction of the arteries. In this case the supply of blood is insufficient to maintain the proper consistence, or it may be entirely intercepted, so that the part loses its vitality, and passes into a state of sphacelus.

The softening of an organ, induced by inflammatory or other secretions, is frequently confined to one of the component tissues, especially to the cellular membrane. The readiness with which the serous envelope is stripped from a parenchymatous organ depends more upon the softness of the subserous cellular tissue than of the organ itself; and, in like manner, the softness of the whole organ is often assignable rather to the deficient tenacity of the membrane which unites its lobules, than of the proper tissue.

The indications of softening during life, if the part is removed from physical examination, consist in aberrations of function, which will be described under the pathology of the respective organs. The appearances after death cannot be spoken of in a general way, as they vary with the normal consistence, vascularity, and anatomical constitution of the part inspected; but we must be careful not to confound morbid with *cadaveric* softening. The latter may be produced, 1. by transudation of the more fluid part of blood from the vessels; 2. by hypostatic congestion; 3. by infiltration with serum effused during life; 4. by the natural secretion of the part, *e. g.* the gastric juice; 5. by incipient putrefaction.

The altered colour of a softened tissue is chiefly derived from the predominant fluid, as *red* and *brown* softening from the admixture of particles of blood; the *yellow* variety from pus or serum; the *white* from a deficiency of blood: the last mentioned form is not unfrequently conjoined with atrophy. Sometimes the colour remains scarcely, if at all, changed, as in the heart, the liver, and the mucous membranes.

Induration. We feel some hesitation in numbering this among the diseases of nutrition, since it is rather an effect of, than in itself, an altered action. There are however many changes of structure, in which the increased consistence is the most striking character; and we have therefore followed the example of Andral and others, in giving them a separate place in this pathological summary, notwithstanding they might be fitly distributed under other categories. The truth of the latter statement will force itself upon the mind in considering the different kinds of induration; these may be conveniently arranged as follows:—

1. Induration with hypertrophy; in which a greater number of molecules are crowded in a given space. Of this kind is that ivory-like hardening of bony tissue, called *eburnation;* such also the induration met with in the pancreas, the lymphatic glands, the heart, and, more commonly than elsewhere, in the cellular tissue.

2. Induration from fibrinous or heterologous deposition. The hardened edges of ulcers, the induration of veins, the grey induration of chronic pneumonia, and that peculiar condensation of the subcutaneous cellular

tissue met with in young children, illustrate the former; and, for examples of the latter, we need only refer to some of the foregoing sections.

3. Induration by transformation, as of fibrous tissue into cartilage, and of cartilage into bone. (See *Transformation.*)

4. Induration by compression, as in the splenisation of pulmonary tissue condensed by pleuritic effusion.

5. Induration with obstruction, from fluid or solid matter, as in pulmonary hepatisation whether inflammatory or hæmorrhagic, carnification, &c.

6. Induration by sanguineous turgescence, or confinement of fluid beneath a fibrous envelope, as in splenitis, orchitis, subfascial œdema, or suppuration, &c. This might be called false induration.

Transformation. This form of diseased nutrition consists in the production of a tissue in some part of the body where it does not exist normally: the new tissue is similar to what exists in some other part of the body. Thus cellular membrane may be converted into mucous, fibrous tissue into bony, parenchymatous substance into cellular membrane, &c. Many transformations are physiological; those, namely, which occur in the development and decline of the whole system.

The tissue which at first sight appears the most susceptible of transformations is the cellular membrane; but as this is the elementary canvas upon which the other textures are woven, the conversions are sometimes produced by the addition of other tissues. Understanding its transformation in this manner, it may be said to be convertible into every other tissue, but not in every situation: thus it can undergo nervous or muscular transformation only in parts where these substances are found normally. Hence these changes are only observed after solution of continuity. But cellular membrane is not merely the matrix of new tissues; it may be really transformed, as into serous and mucous tissues. Any of the structures again may be changed into cellular membrane; a transmutation which is effected by mere atrophy of the proper substance, so that nothing is left but the primary web. This occurs in muscles, tendons, and glandular organs.

Transformations, strictly so called, and, as such, consisting in the substitution, rather than in the addition or subtraction, of molecules, are found in those tissues only which undergo corresponding changes, either in the embryonic development of man, or in other species. Such are the muscular and fibrous, which are mutually convertible; such also the cartilaginous and osseous, and the mucous and cutaneous.

An exception to this law might be supposed to exist in the accidental erectile tissue, as it has been called, found in the skin, and in mucous membranes; but this growth does not properly belong to transformation, but to the hypertrophy of the capillary vessels, which are so overgrown and dilated as to present the appearance of a congeries of veins. It constitutes vascular nævi on the skin, and fungous excrescences on mucous surfaces. These must not be confounded with the fungoid tumours which belong to carcinomatous formations.

The transformations of tissues often harmonise with the altered functions; and hence the former have been said to be the effects of the latter. But this is manifestly confounding final with physical causes. In every case of this nature we shall find that, although the new structure may be well adapted to the different use of the part, the change has been preceded by evident alterations in the physical circumstances. To take an instance: the mucous lining of a protruded rectum or vagina is subjected to evaporation, and unless it is irritated by friction, so as to secrete a larger

quantity of mucous fluid than is natural, the epithelium is gradually converted into epidermis, and the true mucous tissue into dermoidal, to which change the removal of the more fluid particles must greatly contribute. On the other hand, if two portions of skin are kept in close and constant contact, so as to exclude the operation of the atmosphere, the fluid which transudes keeps them continually moist, and the epidermis becomes epithelium, and the dermis resembles mucous tissue. This change may be seen between the folds of the skin in very young children, and in adults between the pendulous mammæ and the adjoining skin of the thorax. Adhesion in such cases is prevented by the inorganisable nature of the secretion.

The conversion of a portion of subcutaneous cellular membrane into a synovial sac or bursa, is occasionally observed in parts subjected to unusual friction and movement of the skin. Sir B. Brodie discovered a sac of this kind beneath the skin which covered a hump-back ; it appeared to be caused by the continual sliding movement to which the integuments were subjected. Similar formations have been found upon club feet, where unnatural rubbing surfaces have been caused by the malformation, and also upon the shoulders of persons who carry burdens. It is easy to conceive that this kind of motion might rupture the cells of the tissue, so as to form one large cavity out of several, and that by the frequent rubbing of the opposite surfaces of the cavity lubricated by fluid, adhesion would be prevented. To such an alteration of structure, motion of the skin, as well as friction, is necessary ; for in parts of the surface where the integuments are not sufficiently loose to allow of such change of place (for example on the inner surface of the fingers and palms), the effect alluded to does not occur ; we find only hypertrophy of the epidermis and condensation of the cellular tissue. False synovial capsules are also presented in luxations and in ununited fractures ; and their production may be traced to a similar mechanical agency, not upon cellular tissue, but upon the plastic lymph previously effused and organised. We believe that all transformations which succeed to changes in the external circumstances of the part are the direct effect of such changes ; but it is an admirable proof of contrivance, that the effects are generally such as either make the part serviceable in its altered circumstances, or save it from further injury.

Many transformations are independent of external agency. The ossification of the cellular membrane between the inner and middle coats of arteries, the cartilaginous productions in sero-fibrous membranes (as in the pleura), the bony deposits in the valves of the heart, and many analogous alterations, originate in changes of the capillary circulation (inflammation and fibrinous secretion), or in the composition of the blood, and are in fact diseases of nutrition, of internal origin.

The transformation of cellular membrane into mucous is an interesting process. It is seen in fistulous communications with mucous cavities, or with the skin : the lining membrane of such passages resembles that of excretory ducts, in its physical properties and in the absence of follicles. In these formations there has been inflammation of the cellular tissue, then suppuration, and the production of a cavity lined by a membrane of organised lymph. The latter, which becomes the mucous tissue, secretes a substance indisposed to organisation, which in its turn irritates the membranes which furnished it, and, by attracting blood in greater quantity to the capillaries, may have something to do with maintaining the vascularity characteristic of mucous membranes. This latter effect is further promoted by the contact of air or of substances received from the adjoining mucous

cavities, but it is not dependent on these, since we observe a similar formation in shut sacs, as in chronic abscesses.

Ulceration. This is a disorder of nutrition inducing solution of continuity. It differs from atrophy, because the latter affects a whole organ, or at least one of the component tissues throughout; but in ulceration the want of nutrition produces a complete loss of substance in one particular part, sufficient to destroy the continuity. The process has generally been attributed to a predominance of absorption over deposition; but with insufficient proof, since all the circumstances which favour the ulcerative change are, to say the least, as likely to interfere with deposition as to promote excessive absorption. Indeed, if we allow that the absorption continues in the normal degree, a diminished nutrition is fully adequate to explain the loss of substance.

Gangrene is the most frequent antecedent of ulceration. The vacant space left by the part which has lost its vitality is often called an ulcer, though in reality no truly ulcerative action is taking place. In many cases, indeed, the process is the very reverse of this; that is, fibrin is exuding and undergoing organisation, so as to repair effectually the breach of surface. Suppuration generally accompanies the granulating action; and when it is very profuse, the deposition is diminished to such a degree as to be barely, if at all, sufficient for counterbalancing absorption. In this case the ulcer deepens; in other instances, the fluid secreted is not healthy pus, but a thin serous matter, which indicates either a deficiency of blood in the part, or blood of a depraved quality.

When we consider then the nature of the local circumstances which favour ulceration, such as an obstructed or languid capillary circulation, and excessive suppuration, as well as the conditions of the whole system, such as advanced age, a cachectic, or debilitated, or ill-nourished habit, all which circumstances are evidently adverse to nutritive deposition, we need not look for any other cause of ulceration than diminished nutrition. This view will be strengthened by observing the effect of remedies often employed in counteracting the process—a nutritious generous diet, tonics, and stimulants. When measures of an opposite class are employed, their object is to restrain the accompanying congestion and inflammation, which may become too violent for the nutritive secretion. For if the accumulation of blood is excessive, it may increase the suppuration, or stop nutrition altogether by running into gangrene. A certain amount of suppuration is often hailed as favourable to reparation; it is, however, not a cause of the latter, but a sign that the capillary circulation is sufficiently active.

Pressure is generally supposed to promote ulceration by increasing absorption, but it seems very difficult to understand how compression should quicken this action, and we think it far more probable that it only impedes the nutrition by excluding the nutrient fluid.

Mortification is the entire arrest of nutrition, secretion, and all vital action in the part affected. While restoration is possible, it is distinguished as *gangrene;* when the part is entirely given over to the play of inorganic affinities, it is called *sphacelus.*

It is not our intention to enter into a description of this condition, as it will be considered in another place; we shall only enumerate its principal pathological causes:—1. It may be the effect of mere mechanical obstruction to the capillary circulation; such as the pressure of morbid deposits, pressure from displacement (as in intus-susceptio and strangulated hernia), ossification of arteries, &c. 2. Inflammation may be followed by mortifi-

cation, not only on account of the change in the capillary circulation proper to inflammation, but also from the pressure induced by the very products of inflammation: hence the sloughs in furunculus, in diffuse cellular inflammation, and in gangrene of the lung. 3. An alteration of the blood, as in patients labouring under malignant fevers, in children of a bad habit affected with *cancrum oris*, and in persons suffering from animal poisons, or from insufficient or unwholesome food. The gangrene induced by spurred rye is an example of the latter. 4. A subversion of the organic affinities by chemical agents, as corrosive substances, or by agents probably acting through the nerves, as cold, mental emotion, concussion.

A mortified part is said to be separated from the adjacent tissue by suppuration. It would be more correct to say that the suppuration is a sign of vital action in the part where it occurs; in other words, that it shows that the part is not undergoing the same process as that which adjoins it.

DISEASES OF THE BLOOD.

WE shall divide diseases of the blood into two principal classes: the first including the opposite states in which the blood is redundant or defective; the second comprising those states in which the composition is at fault, or cachæmia.

Plethora—otherwise named polyæmia, or hyperæmia—has been seen to occupy an important position in relation to the pathological conditions which have passed under review. Several species have been fancifully distinguished by authors, but we do not think it needful to advert to more than the two following,—*absolute plethora* and *relative plethora*. The first of these exists when there is a redundance of blood, notwithstanding secretion and nutrition have their normal activity. Its most frequent cause is the elaboration of a larger quantity of the blood, either by the combined effect of superabundant or rich aliment and of vigorous digestion, or by the simple agency of the latter, as in persons who continue plethoric although the diet has been reduced below the ordinary standard. These causes are greatly aided by want of exercise and by sleep, under both which circumstances there is less expenditure of the constituents of the blood.

The existence of plethora is often very plainly indicated by the distension of the capillaries, as observed on the cheeks, lips, and mucous surfaces; by the full, round, resistent pulse; and by the swollen appearance of the veins. These signs are compatible with high activity both of the animal and organic functions. But in many cases the organs of the former are oppressed by the loaded circulation: hence the somnolency, the indisposition to exercise, the dulness of the senses, and the torpor of the intellect. The blood in this form of plethora is for the most part of rich quality, that is, abounding in fibrin and in red globules. Obesity is often an accompaniment, but by no means an infallible sign, of plethora, as we have already remarked under the head of *Hypertrophy*. The diseases of which plethora is so frequently the parent are congestion, inflammation, hæmorrhage, dropsy, and hypertrophy.

Relative plethora might be described as plethora by obstruction, because the redundance of blood depends upon defective secretion. It occurs in persons whose cutaneous and pulmonary transpiration is less than natural (which state is often the effect of deficient exercise and the consequent languor of respiration), and who have scanty discharges from

the bowels and the urinary organs : hence it has also been called excrementitious plethora. Sometimes the redundance is owing to the suppression of some particular secretion, as the menstrual, or of a discharge, which from long habit has become almost natural to the system, as a hæmorrhoidal flux, or of the secretion from an old ulcer or issue.

This state is often attended with general languor, deceitfully imitating debility and exhaustion, both in the muscular and the circulating organs ; but its real nature may be unmasked by carefully inquiring into the proportion between the ingesta and the egesta ; by observing the character of the pulse, which, though readily yielding to pressure, as readily rebounds upon its removal ; and by noticing the rapidity with which the veins are filled after they have been emptied by compression. This false kind of weakness has been well-discriminated by Dr. Barlow in the *Cyclopædia of Practical Medicine*, art. PLETHORA.

Anæmia — otherwise called hypæmia or oligæmia,— is the opposite of plethora. The diminution in the quantity of the blood may be owing to hæmorrhage, whether morbid or accidental; to scanty innutritious food ; to impairment of digestion, or a fault in some other part of the complicated process of sanguifaction. Anæmia, except as the direct consequence of hæmorrhage, is seldom or never met with uncombined with alterations in the quality of the fluid. The existence of anæmia is readily attested by the pallid hue of the complexion and of those parts of the mucous surfaces within sight; by the smallness or extreme softness of the pulse (except during the state of false excitement); and by the shrunken appearance of the veins. It leads to more immediate functional disorders than plethora. Thus, in the nervous system, we find either unnatural excitement, as delirium, intolerance of light and sound, convulsions, &c.; or depression and hebetude, as indicated by dimness of vision, loss of memory, inaptitude for mental attention, muscular weakness, and, in the circulation, either violent irregular action of the heart with a throbbing open beat of the arteries, or syncope and a thready pulse. The secretions in the more moderate degrees of anæmia are lessened, but in extreme cases there may be diarrhœa and profuse perspirations. These occurrences depend rather on the serous condition of the blood than on its defective quantity. No function is more obviously deranged than that of the stomach, which is not only incapable of digestion, but often presents an uncontrollable irritability, rejecting even the lightest kinds of nutriment. Some of the more gradual results of anæmia are dropsy, atrophy, and softening.

Cachæmia. We shall first speak of certain changes in the mere physical qualities of the blood; 2. of the changes in its chemical composition ; 3. of changes known rather by inference than by actual demonstration. 1. There appears to be a certain relation between the consistence of the blood and the porosity of the vessels, so that any considerable variation of the former is productive of serious disorder. If the fluidity is excessive, transudation of the thinner parts is the consequence ; if viscidity, there is retardation of the flow or absolute obstruction. Hence, in the former case, result œdema and serous fluxes*; in the latter, congestion, inflammation, and their consequences. It is always difficult however to separate these alterations of the mechanical from those of the chemical conditions, as well as from vital lesions. Magendie has performed a great variety of ingenious but rough

* These accidents do not necessarily occur. We have known a most serous condition of the blood in persons who presented no sign of dropsy on the one hand, or of excessive discharges on the other.

experiments, in illustration of the effects of purely physical changes of the blood.* The colour of the circulating fluid undergoes considerable alterations in disease. But we cannot of course speak of their effects, as separable from the chemical changes. The same remark is applicable to variations in the *specific gravity* and the *temperature* of the blood.

2. The constituents of the blood may be in excessive or defective proportion, or may present a morbid quality.

A redundance of fibrin often occurs in plethoric subjects, so that blood abstracted from them forms in its coagulation a large dense clot. The red particles are generally at the same time abundant; which must be taken into account when we estimate the proportion of the cruor. The mere volume of the cruor is greatly dependent on the degree of solidification which the fibrin acquires. If this substance is deficient in relation to the red particles, the cohesion of the clot will be slight, because the globules are kept at a greater distance: this sometimes occurs even in plethoric subjects. On the other hand, pale blood may present a very dense coagulum, because the red globules are not in sufficient quantity to interfere with the close approximation of the fibrinous particles. But often both the red globules and the fibrin are in a minus proportion, and the coagulum is then both small and loose. We have seen blood drawn from a weak hysterical female, which presented, instead of a proper clot, a sediment like red paint at the bottom of the serum, and readily diffused through the latter by shaking the vessel. It is extremely difficult to determine whether the want of firmness in the crassamentum is owing to the small quantity, or to the quality, of the fibrin, because the latter may be affected by causes of the most transient operation, as by impressions on the nervous system. In persons who have died suddenly from concussion, or by direct asphyxia, the blood is often found quite fluid. In malignant fevers it has very little tendency to coagulation; but whether this is occasioned by an actual deficiency, or by a depravation of the fibrin, has not been proved. Magendie has fancied that he artificially produced this condition by withdrawing from an animal a certain quantity of its blood, depriving it of its fibrin, and then injecting the residuum into the veins. It scarcely needs to be remarked how coarse an imitation is presented in an animal, which has undergone this usage, of that complex morbid condition which constitutes typhoid fever.† A neater experiment was that of injecting a quantity of carbonate of soda, sufficient to prevent the coagulation of the fibrin. After this operation M. Magendie found that the animal often died from obstruction of the pulmonary circulation, occasioned by the transudation of serum into the cells and tissue of the lung. In other instances, there were ecchymoses, great prostration of strength, ulceration of the cornea, &c.

The buff of inflammatory blood has been attributed to the slow coagulation, which allows the insoluble red globules to subside from the upper layer of the fibrin, and to the large quantity of the latter constituent; but cases occur in which the former of these conditions is wanting. We are far more inclined to follow the opinion of Dr. Alison‡, that there is an actual repulsion between the fibrin and the red particles in inflamed blood. This view is supported by the fact, that the fibrinous crust sometimes is formed all but immediately after the issue of the blood from the vein, and that in very thin layers the separation takes place laterally. This tendency in the

* Leçons sur la Vie, *passim*.

† It must require some practice in M. Magendie's *canine clinique* before one could be satisfied that a *defibrine* dog is the representative of a typhoid patient.

‡ See Outlines of Physiology and Pathology, p. 400.

fibrin to separate from the red globules, as well as its increased quantity, must be intimately connected with those formations which have been hinted at under the head of *Fibrinous Secretion*. Blood, in this condition, is associated with an active state of the circulating system, as in rheumatism and in pregnancy. When the serum is excessive, the red globules are for the most part proportionately deficient : the latter are not easily repaired. Hence the pallor is not unfrequently permanent in those who have suffered severe hæmorrhage. A large proportion of red globules is generally coincident with an elevated temperature of the blood, but will not alone produce this effect, to which an active respiration is most essential. M. Donné, one of the most industrious and intelligent of microscopic observers, has detected alterations of the globules themselves, as to their appearance, composition, arrangement, &c. in various diseases ; he has likewise drawn attention to the proportion which the white globules bear to the red * ; but as yet there is nothing very definite in the results of these researches.

The principal constituents of the serum are water, albumen, and saline matters. The first of these is most abundant in what is called the serous condition of the blood, of which we see striking examples in chlorotic females. Albumen may exist in double its usual quantity in inflammation ; but it is deficient in cases of dropsy connected with albuminous urine ; and in these the specific gravity of the serum is correspondingly lessened.

The saline matters which impart the florid hue to the blood are deficient in certain fevers, according to the researches of Dr. Stevens : they have also been found wanting in the blood of cholera patients ; but in the latter their diminution is owing to the loss of serum, which has drained away from the intestinal surface, leaving behind it a dark, thickish, but incoagulable fluid, which stagnates in the capillaries. That an excess of the saline ingredients diminishes the coagulability of the blood, has been proved by experiments : hence we may derive an explanation of the state of the blood observed in that form of scorbutus which is caused by the long-continued use of salted provisions.

The blood sometimes contains substances foreign to its usual composition—such are bile and uric acid. Whether these must have been absorbed before they can appear in the blood is not absolutely determined. We think it probable that the colouring matter of the bile may be formed in the blood, because the tinge has often existed when there was no such obstruction in the biliary system as would have been likely to induce its absorption ; nay, some have asserted that the blood in health contains a certain quantity of that yellow matter which is superabundant in jaundice †.

3. Vitiation of the blood is inferred from, (*a*) the deficiency of excretions, as has already been remarked under relative plethora; (*b*) the peculiar products, such as tuberculous, carcinomatous, and melanotic deposits—the thin ichorous discharges of certain ulcers—the lithates formed in the joints of gouty subjects, &c.; (*c*) the production of a disease, by injecting into the veins of an animal blood taken from another of the same species labouring under the same disease, as in the experiments of MM. Dupuy and Leuret, who in this manner communicated malignant carbuncle from one horse to another ‡; (*d*) the effect of purulent matter introduced into the blood ;

* See Arch. de Méd. Jan. 1838. M. Dubois (d'Amiens) has detected irregularities in the shape of the globules of blood taken from scrofulous subjects. (*Encyclogr. des Sc. Méd.* April, 1839.)

† M. Denis de Commercy, Essai sur l'Application de la Chimie a l'Etude Physiologique du Sang de l'Homme, &c. &c. 1838.

‡ See Andral, Anat. Path. tom. i. p. 540.

(*e*) the absence of changes in the solids sufficient to account for certain symptoms during life, which is remarkably exemplified in certain cases of puerperal fever, and is in some degree true of every form of idiopathic fever; (*f*) the influence of certain articles of food in suspending the process of nutrition, as in the dry gangrene produced by ergot of rye. In this case it is an easier hypothesis to suppose, that the blood is so vitiated by the deleterious agent introduced into it, as to be unfit for nutrition, than that it produces a specific disturbance of the nutritive affinities.

The causes of cachæmia are in many cases not difficult to ascertain: a fault in the apparatus, or in the function of chylifaction, or a deficiency or ill quality of its materials, are some of the most obvious antecedents. We may trace their influence by actual observation: but the operation of other causes is rather inferred than really witnessed; such, for instance, is the gradual depravation of the blood caused by impeded respiration, or by the retention of excrementitious matters, owing to deficient excretion of the skin, the liver, and the kidneys. It cannot well be doubted that privation of the due stimulus of light, and that certain conditions of the atmosphere, especially the presence of impurities, exert, directly or indirectly, a pernicious influence on the composition of the blood; but we are not prepared to describe the precise mode of their operation; and indeed, with reference to all the causes of cachæmia, we can do little more than indicate, in a general way, the channels through which the blood may receive its contamination, as we have already attempted to do when speaking of the tuberculous cachexy.

DISEASES OF NERVES AND CONTRACTILE FIBRES.

Local disorders of sensation and motion might at first be judged to belong either to the special pathology of the nervous and muscular systems than to their present position; but as a part of the apparatus of these functions is so extensively distributed through the organs as to be arranged by anatomists among the elementary tissues, there seems, upon this ground alone, a reason for regarding some of its derangements as of an elementary character; besides which, we know as a fact, that there are disturbed sensations and motions, purely local and independent, that is, neither traceable to disease in the central organs of innervation, nor dependent on diseases of the capillary system and the blood. It is true that those organic changes which immediately precede or follow those affections of consciousness, in which sensation and volition respectively consist, take place in the cerebro-spinal axis; but it is no less true that the nature of the sensation is intimately related with the nature of the impression from the sentient nerve, and the motific impulse with the state of the nerve of motion. The pain produced by the prick of a needle is a disordered sensation; but it originates in the part affected, the disorder of the sensation being secondary to that of the impression. We might then, perhaps, have more fitly designated the local derangements of sentient nerves, as disordered impressions; but we have not thought it necessary to do so, because, in ordinary medical language, both impressions and sensations are included in the latter term.

But it is less our object to draw attention to these disorders as affecting the extremities of the nerves, than to the circumstance that they may be unconnected with any of the pathological changes which have been described in the preceding chapters. They are so often the accompaniments or consequences of the latter, that their independent existence is apt to be overlooked; and by this means very grave errors may be committed in practice.

They have been often considered as the signs of other diseases, rather than as forming in themselves objects of treatment; and from the great similarity which they sometimes bear to other affections, they may be called imitative. An instance or two will render this remark more intelligible. Inflammation of the mucous lining of the larynx produces a peculiar hoarseness of the voice, a clanging cough, and a sense of suffocation, these being the effects of contiguous irritation extending to the laryngeal nerves and muscles. The occurrence, then, of these three symptoms might seem to indicate an inflamed condition of the mucous membrane of the part did we not know that, in some instances, they are presented under circumstances which render it certain that the disordered action, instead of being secondary to the affection of the mucous membrane, was primary. Such cases are not uncommon among hysterical subjects. To take another example,—one of the most constant symptoms of inflammation of the peritoneum is pain in the abdomen, with tenderness on pressure; but it may exist in the most intense degree, notwithstanding no such disease is present, and it then requires a very different treatment. A similar fact has been noticed with regard to the articulations, particularly of the knee. In consequence of the long-continued and severe pain, it has often been supposed that the joint was affected with capsular inflammation, and the patient has been treated accordingly; and only after a considerable time, and the failure of such treatment, has the affection been discovered to be of a purely neuralgic character.

The derangements of sensation might be classed under, 1. *Hyperæsthesia*, including all undue degrees of sensation, such as intolerance of light and sound; violent hunger and thirst; extreme susceptibility to heat, cold, and electric or hygrometric changes of the atmosphere; inordinate sensibility of the bladder and rectum, &c. &c. 2. *Anæsthesia*, comprising hebetude and absolute loss of sensation. 3. *Dysæsthesia*, or perverted sensation; to which belong the various kinds of pain, and those strange anomalies of feeling in every part of the system so common to hypochondriacs.

The disorders of motion are *Spasm* and *Paralysis*. Spasm is said to be *clonic* when the contraction alternates with relaxation, as in convulsions; *tonic*, when it remains fixed. Spasm may affect those muscular fibres which contract by virtue of a stimulus applied to them directly, as in the intestines; those whose movements are dependent on the spinal marrow, as in the larynx, the bladder, the rectum, &c.; and those called exclusively involuntary, as in torticollis or wry neck. Paralysis may be followed through the same divisions of contractile organs.

The general condition with which this class of affections is most frequently connected, is a peculiar susceptibility, or mobility, of the nervous system, and might be called the *Neurotic Diathesis*. This may be either inherited, or acquired through the long-continued action of causes which weaken the nervous system: such are undue excitement of the intellect and the emotions; insufficient exertion, as among the indolent and luxurious; the indulgence of exhausting gratifications; the excessive use of narcotic substances in diet, including fermented liquors of all kinds, tea and coffee, and of narcotic drugs, as opium and tobacco. Long-continued disease of a painful nature, or attended with hæmorrhage, will induce the nervous habit.

Individuals of this diathesis feel impressions of all kinds more keenly than other persons; but, for the most part, there are some particular excitements to which they are especially sensitive. One may be affected by colours, another by sounds, a third by odours, a fourth by changes of the

weather. Their temper is irritable rather than violent; the emotions which they entertain are often of the most vivid description; they are quick to conceive aversions and fears, which however are not less transient than sudden; their apprehensions invest objects with a very disproportionate interest, and these are frequently connected with the state of their bodily organs. At the time that they manifest the greatest susceptibility of alarm on such subjects, they may in other matters exhibit the utmost courage, fortitude, and strength of resolve. The intellectual faculties are often powerful and active, but the imagination is apt to acquire an undue ascendancy. The muscular system may be capable of considerable feats of strength; but it betrays irregularities of action, as in tremors, stammering, twitchings of the features, and *tricks* (as they are commonly called) in the extremities. The organic functions in persons of this habit are also prone to sympathise strongly with the nervous system: hence the palpitations, the faintness, the hurried breathing, the disturbance of the appetite, the indigestion, the qualms, flutterings, &c. of which they complain, when the mind has been agitated by any unusual event.

Not unfrequently certain expressions of the countenance, the tone of the voice, and the general deportment, are quite sufficient to enable us to recognise the diathesis. But some individuals have so learned to subdue these outward demonstrations, that it is only by questions calculated to elicit such peculiarities as we have noticed, that a right knowledge of the constitution can be attained.

INFLAMMATION.

General view of the phenomena of inflammation. — Present state of our knowledge of its essential nature. — Causes. — Anatomical characters. — General view of the symptoms. — Varieties and complications. — Modes of fatal termination. — Outline of the treatment of inflammation, particularly in internal parts.

General view of the phenomena of Inflammation. INFLAMMATION — a term derived from *inflammo*, to burn, and suggested probably in the early ages of medicine by an erroneous idea of the nature of the changes which it denotes — has yet been employed, in all ages, as a short and significant expression for a combination and succession of phenomena, regarded as among the most frequent and most important of any with which the physician or surgeon is conversant; phenomena consequent on every mechanical injury applied to the living body, and frequently excited, in a greater or less degree, by most of the noxious agents to which we give the name of poison, and by almost every other influence or external cause which is capable of injuriously affecting it. And it has been generally agreed, that the most distinctive marks by which this diseased state in any part of the human body, or of the most analogous animals, can be recognised, are those employed for that purpose at least as long ago as the time of Celsus, viz. the combination of *pain*, *swelling*, *heat*, and *redness*, in any one part of the body.

But as preliminary to any discussion on this kind of diseased action, it is necessary to advert to the objections raised against the whole doctrine of inflammation as usually delivered, and the very use of the term, by two of the most celebrated pathologists of Paris, Andral and Magendie, who concur in representing the phenomena included under this term to have been inaccurately and imperfectly generalised, and the term itself to have been so vaguely applied, as to have injured the progress of science.*

It seems sufficient to say, however, in regard to these objections, that they were obviously suggested by the use made of the term inflammation, and the theories connected with it, by the school of Broussais in France, whose doctrines were never adopted by any considerable numbers of the practitioners or teachers of medicine in this country. It has always, we believe, been generally thought in this country, and it seems now to be generally admitted in France, that the term inflammation was too hastily applied by that school to appearances in the dead body, to which it is either partially or not at all applicable; and likewise, that the local changes thus denoted were too hastily regarded as the cause of the constitutional and often fatal fever with which they are found to be connected. But the proper conclusion to be drawn from the exposition of these errors is, not that the term inflammation should be abandoned, or that the numerous and accurate observations, comparisons, and inferences, made and confirmed by so many medical observers on the diseases which they have termed inflammatory, should be set aside; but only that the phenomena, whether

* "Crée dans l'enfance de la science, cette expression toute métaphorique était destinée à représenter un état morbide dans lequel les parties semblent bruler, s'enflammer, &c. Reçu dans le langage, sans qu'aucune idée précise lui ait jamais été attachée, sous le triple rapport des symptomes qui l'annoncent, des lésions qui la caractérisent, et de sa nature intime, l'expression *inflammation* est devenue une expression tellement vague, son interprétation est tellement arbitraire, qu'elle a réellement perdue toute valeur; elle est comme une vieille monnaie sans empreinte, qui doit être mise hors de cours, car elle ne causerait qu'erreur et confusion." (Andral, *Prècis d'Anat. Pathol.* tom. i. p. 9.) Nous sommes loin de nier l'existence des phénomènes dites inflammatoires, mais nous ne pouvons pas accepter la dénomination consacrée." (Magendie, *Leçons sur les Phénomènes Physiques de la Vie*, tom. iii. p. 383.) "Quand il nous arrive de prononcer le mot *inflammation*, c'est plutôt pour en faire la critique que pour y attacher un sens defini." (*Ib.* 423.) "On finit un livre entier de toutes les idées que représente le mot inflammation, car il est synonyme du mot maladie." (*Ib.* p. 445.)

in the living or dead body, to which this name is to be given should be more strictly defined, the varieties of which they appear susceptible more carefully described, and the connection between these local changes and the concomitant constitutional derangements more clearly ascertained.

In order to give the requisite precision to the general notion of Inflammation, as a local change of the condition of any part of the body, it seems only necessary to include in it, besides the pain, swelling, heat, and redness, the tendency always observed, even when the changes in question are of short duration, to *Effusion* from the bloodvessels of some new products ; speedily assuming, in most instances, the form either of coagulable lymph or of pus.* It is true, that there may be inflammation either of so slight intensity, or so short duration, as never to show these, its usual consequences ; but we shall escape a great deal of useless verbal discussion and misapprehension, if we lay it down as a rule, never to apply the term except in cases where we are satisfied that the tendency to these effusions exists, and that, if they do not appear, it is only because of the minute scale, or the rapid abatement, of the diseased action. A peculiar *perversion of nutrition, or of secretion*, we hold to be essential to the very existence or inflammation ; and all descriptions, and all attempts at explanation of the changes to which the term is applied, if they do not include this their most essential peculiarity, we must regard as necessarily and fundamentally defective. It is true, that the various effects which we ascribe to inflammation, adhesion, suppuration, ulceration, gangrene, are very different from one another, and that we cannot satisfactorily point out the cause, or even the mode, by which each is effected; but we may be fully assured, from ample observation, that all these occur as effects of an inflammatory action, originally of the same kind ; we can go a certain length in pointing out the conditions under which each of these results takes place, and we may refer to these as general and established facts, in many pathological discussions, on more obscure phenomena.

We may therefore begin this subject by briefly enumerating the *local changes*, and the principal varieties of these, which are observed in any part of the body during the progress of what we call the state of inflammation — including, in this enumeration, both those changes which are on so small a scale as to be visible only under the microscope (which, of course, have only been satisfactorily seen in the translucent parts of animals), and those which make themselves obvious to the unassisted senses, and are seen in all the textures.

Immediately after the application of a stimulus which is capable of exciting inflammation — especially if it be one which acts on a large surface, as alcohol applied to a membrane — a constricted state of the small vessels of the part, and an accelerated flow of blood through them, has been distinctly seen by various observers ; but this state is of short duration, and during it the characteristic marks of inflammation are not perceived. After a time, varying from a few minutes to some hours from the first application of the exciting cause, the opposite change in the condition of the small bloodvessels is observed; they become enlarged and distended ; the movement in those most affected is slower than before ; there is often absolute stagnation for a time, and often *oscillation*, in different portions of them, and the globules of the blood which they contain are found to coalesce into irregular masses, in which their individual forms are no longer recognised. This is the condition of those parts in which the redness and swelling are the most intense. In the neighbourhood the vessels are likewise enlarged, while the flow through them is more rapid than natural. Over the whole surface, and especially where the movement of the blood is retarded, many small vessels become obvious, which were not previously seen. This is no doubt chiefly owing to the reception of the globules of the blood

* The "*nisus* aut ad suppurationem aut ad gangrænam," is set down by Frank as one of the essential characters of inflammation. Of these it seems unnecessary here to specify the last termination, inasmuch as it probably never takes place until other characteristic effusions have already fixed the character of the diseased state.

into vessels previously admitting only its clear or colourless liquid; but Kaltenbrunner and others have distinctly observed the formation of new vessels, by globules escaping from the vessels and making tracks for themselves in the surrounding textures. It does not appear that either acceleration or retardation of the flow of blood is essential to the state of inflammation; and although the latter state is always predominant in the parts most severely affected, yet, partly in consequence of the accelerated flow in the neighbouring vessels, and partly of the increased quantity of blood received, more than compensating for its slower progress through the most diseased part, the whole quantity of blood returned by the veins from an inflamed part (as in the case of the hand) is found to be greater, and, when the inflammation is severe, to be three or four times greater than that returned, within the same time, by the veins of the opposite sound organ.

Within a time, which is likewise various, but often very short, from the beginning of these changes, the characteristic effusions of inflammation begin to show themselves, chiefly, perhaps solely, in those parts where the flow of blood is retarded: first, the surrounding textures are loaded with a serous fluid; but gradually changes take place in this fluid, which indicate that other constituents of the blood have exuded from the vessels; or part of the fluid effused assumes a gelatinous consistence, and forms flakes or layers, which gradually become solid. In the semi-fluid matter first effused, according to Gendrin and others, decolorised globules of the blood may often be perceived; and in many cases globules of pus, known by their larger size and freer motion on one another, and, when observed in mass, by their yellow colour, soon appear in this effused matter; and it assumes, more or less rapidly, and more or less generally, the form of purulent matter.

When the inflammation occurs in serous or mucous membranes, the first effusions from the bloodvessels go only to increase, and probably attenuate, the natural exudations from these surfaces; but as the inflammation advances, the fluid thrown out becomes always, as in other parts, of thicker consistence, as well as more copious than natural, and often more or less distinctly purulent.

Along with the semi-fluid lymph effused in the earlier stage of inflammation, there is often extravasation of the colouring matter of the blood, and sometimes of entire blood; but most of the inflammatory exudation, in the cases to which we give the name of simple or healthy inflammation, soon acquires, in most textures, the appearance of the coagulable lymph or fibrin, such as constitutes the buffy coat of inflamed blood. In this effused coagulable lymph it is very generally observed that canals are gradually formed, into which some of the capillaries of the inflamed texture soon effuse blood; these canals are, in the first instance, of larger caliber than the vessels which supply them, but soon contract and assume the appearance of vessels (chiefly of veins, when the inflammation is of healthy character), in which the motion of the blood goes on as in the vessels of other parts of the body, and by means of which this new texture of the body becomes liable to nutrition and absorption, like any of the preexisting textures. It is thus that the permanent Adhesion of inflamed surfaces, and the closing of wounds, whether by the first intention (as it is called), or by granulation, is effected; and that inflammation, within due limits, becomes the grand agent in repairing injuries attended with loss of substance.

On the other hand, the inflammatory effusions are always liable, in a greater or less degree, to the vital action of Absorption; which, although very beneficial in the first instance, and indeed essential to the final disappearance of the disease, very often, in the more advanced stages, extends irregularly to the surrounding textures, and goes on to an extent which is not required for any useful purpose; and it is in this way, chiefly, that inflammation becomes a cause of that irregular breach of substance in the solids of the body to which we give the name of Ulceration.

Lastly, when the inflammation and consequent effusion have lasted some time in any texture, it often happens that the parts chiefly affected gradually lose

their sensibility, change their colour to grey, purple, or black, become soft and flaccid, and ultimately putrid, their circulation gradually ceasing, and all their vital properties being extinguished. This is the termination in Gangrene or mortification, often attended by suppuration and ulceration along the edge of the mortified part, which effects its separation from the living by the process called sloughing; while in other cases (as in what has been called traumatic gangrene) no such process is established to limit the extension of the gangrene, and it is arrested only by the death of the patient.

These obvious changes are attended with less striking, but equally characteristic, alterations in the blood which passes through the inflamed parts. Not only do the globules coalesce into irregular masses, but much of their colouring matter separates from them (*Gendrin*); not only does the liquor sanguinis, or clear fluid of the blood, exude from the vessels, but it comes forth more loaded with fibrin than natural, so as to deposit much of it in the solid form, when at rest; and this effused fibrin appears to have a peculiar firmness of aggregation, for when it exudes on the inner surface of bloodvessels where a current is going on, although fluid in the first instance, it is not carried off by the stream, but "concretes upon, and furs over, the inside of the vessel." (*Hunter*.) And not only does much of the effused fluid often gradually take the form of purulent matter, but the same change has been distinctly observed to take place on portions of the blood contained in the inflamed vessels themselves. (*Gendrin*.)

These local changes are always observed to extend more or less from the point where they commence, before subsiding there. This extension takes place in a much greater degree in some varieties of inflammation (to be afterwards mentioned) than in others; but in all cases two important observations may be made on the extension of inflammation: 1. That it is more apt to take place along the texture where it originates, than to cross from one texture to another; and, 2. That it usually takes place from the original point, as from a centre, in all directions, not following the course either of vessels or nerves, and often passing from one portion of a membrane (as the pleura or peritoneum) to another portion lying contiguous to it, although the vessels and nerves of this portion may arise from a distinct source.

It will be at once perceived, that the symptoms usually and justly regarded as the most characteristic of the early stage of inflammation, the pain, swelling, heat, and redness, are by no means concomitants of the whole progress which we have now sketched. The two latter often disappear long before the diseased actions are over; and the pain is not only usually absent in the inflammation of certain textures, such as the mucous membranes and the parenchymatous viscera, but is necessarily and entirely absent in certain cases of inflammation, which nevertheless run through the whole course which we have described; viz. in those inflammations which succeed the division of the sensitive nerves of the eye, or of the lungs, or which affect the mucous membrane of the urinary passages in complete anæsthesia of the lower parts of the body. Nevertheless, in the natural state, pain readily increased by pressure on any part within reach of the fingers, is very generally a most important diagnostic mark of inflammation.

While these local changes are going on to any considerable extent in any part of the body, general or constitutional derangement very generally attends them. The blood over the whole system gradually assumes that change which is expressed by the term sizy, or shows the buffy coat when coagulating; by which we mean that its fibrin and its colouring matter have a tendency to separate from one another when the former becomes concrete, the cause of which tendency we leave doubtful for the present, only observing, that it does not depend on any alteration of the time requisite for coagulation, being observed under great varieties of the time during which the progress of coagulation goes on. In cases of intense or violent inflammation, two other changes are distinctly observed on the fibrin of the blood, besides its increased tendency

to separation from the colouring matter: *first*, that its proportion to the other constituents of the blood is gradually and often greatly increased; and, *secondly*, that the aggregation of its own particles during the coagulation is increased, so that the coagulum formed becomes preternaturally firm or contracted. This change on the blood out of the body is liable to some variety, and is always gradual, so that it is in general hardly perceptible in blood drawn very early in inflammatory diseases. It is probable, from the microscopical observations already stated, but not fully ascertained, that this change is wrought on the blood only in the course of its progress through the vessels which are the seat of the inflammation.

Farther, in consequence of the existence of local inflammation in any part of the body for a certain length of time, that affection of the whole system to which we give the name of constitutional Fever is very generally excited, liable to great variations, which will be afterwards considered,— commencing by sense of coldness, rigors, and lassitude, which are followed by increased frequency and generally increased strength of pulse, increased heat of skin, and the other symptoms of febrile excitement; and especially marked by the absence of certain symptoms which distinguish the different forms of what we call idiopathic fever,—particularly by the absence of any specific eruption on the skin, or of any of the indications of the dissolved or putrescent state of the blood (petechiæ, &c.); and again by the absence, during the greatest violence of the disease, of those peculiar signs of derangement of the nervous system, to which we give the name of typhoid (the peculiarly overpowering "depressio febrilis" and muscular debility, muttering delirium, subsultus tendinum, and other spasms, stupor, &c.); which form a prominent part of the character of the strictly febrile diseases, but not of the simply inflammatory, excepting in cases where the nervous system itself has been inflamed or injured.

Of the local changes which constitute inflammation, there are, strictly speaking, only two terminations,—the one by resolution, or gradual abatement of the disordered state of the circulation, and return to its previous condition; and the other by death of the part: the former of which appears, on microscopical examination, to consist essentially in the gradual renewal of movement in the stagnating blood, the separation of its globules, which had previously seemed to coalesce, and the return of the distended vessels to their former caliber; the latter, to consist in absolute cessation of movement in the blood, and then the rapid putrefaction, both of the blood stagnating in the vessels, and the recent effusions. But from what has been said, it will be at once understood that, before inflammation can be resolved, there may in many instances be such an amount and continuance of fluid effusions, or such alteration of the structure, or derangement of the functions of the solids, or such affection of the system at large, as may be either permanently injurious, or immediately fatal; and that the study of the different modes of fatal termination of inflammatory diseases, of which we shall presently speak, may be prosecuted successfully, and with great practical advantage, even while the intimate nature of inflammation itself is still very imperfectly understood.

Of the present state of our knowledge as to the essential nature of Inflammation. Having offered this general sketch of the various phenomena to which the name of inflammation, or inflammatory action, is given, we may next, before going farther into details, proceed to inquire, how far the present state of our knowledge enables us to form an opinion of the intimate nature, or proximate cause, as it has been termed, of this deviation from the natural condition of living parts. That any explanation of these phenomena should be very general, and leave much unexplained, is no more than we must expect when we remember, that all explanation is founded on comparison, and that the phenomena in nature which can be brought into comparison with the changes in inflamed parts are neither numerous nor well-understood. Certain principles, however, of essential importance in this inquiry may be laid down with confidence.

I. It has been generally thought in this country, at least since the time of Hunter and Cullen, that any such fundamental morbid changes as have now been enumerated, must depend on alteration of the *vital* powers or endowments of the body, and that no satisfactory explanation of them, on simply mechanical or chemical principles, or by any combination of the two, is to be expected. It must therefore surprise most of our readers to meet with the recent and bold assertion of Magendie, that "l'irritation et l'inflammation artificiales sont tout simplement des resultats mécaniques." (*Op. cit.* tom. iii. p. 433.) It might indeed be supposed, that as this author objects so strenuously to the use made by others of the word inflammation, he may employ it himself in a more restricted sense, to which this assertion may be strictly applicable; but he has clearly stated in his dissertation on this subject (particularly in tom. iii. p. 423. et seq.) that he considers not only the pain, swelling, heat, and redness, but the inflammatory *effusions* and ultimately the gangrene—in short the whole phenomena of inflammation as we understand the term—to be the natural consequences of mere obstruction of the capillary vessels, and consequent distension of those in their vicinity, "qui se gonflent, et laissent échapper à travers leurs pores aggrandis, du sang en substance ou quelqu' un de ses matériaux." "Du moment qu'il existe un défaut d'harmonie entre le diamètre des capillaires et le volume des molécules sanguines, des obstructions surviennent, et alors apparaissent les caractères de l'inflammation." "Elle diffère de la congestion en ce, que dans celle-ci il n'y a que dilatation des capillaires sans obstruction ni rupture de leurs parois." (p. 424-6.) Again, he thinks, "l'élévation de température de la partie inflammée rend très bien compte de ces transformations chimiques qu'éprouve le sang dont la marche a été accidentalement suspendue," *i. e.* as he afterwards explains, of the parts extravasated being either redissolved and absorbed into the blood, or being combined with other matters, changed into pus, and thrown out of the blood. Thus he considers himself entitled to set aside all "théories sur l'irritation et l'inflammation ou l'on n'envisage jamais que les modifications apportées à la vitalité des tissus;" and he considers them so injurious to the progress of science, that "il importe d'en anéantir les derniers vestiges." (p. 433.) Notwithstanding these confident assertions, we have no doubt that the attempt to resolve all the phenomena of inflammation into the mechanical and chemical effects of obstruction of the capillaries, will be generally regarded in this country as a step backwards, instead of forwards, in pathology. Considering inflammation as a condition of the living body, in which an alteration of secretion and nutrition, as well as of the capillary circulation, is essentially concerned, we would apply to it the language of Magendie himself on the physiology of these functions:—"Sans doute il se passe au sein des vaisseaux capillaires des phénomènes que la physique ne saurait expliquer: sans cesse de nouveaux matériaux sont déposés et reposés dans la profondeur de nos tissus; c'est cet échange mutuel de molécules vivantes qui constitue l'acte important de nutrition. Qui pourrait se flatter de soulever le voile dont la nature se plait à envelopper ces mystérieuses fonctions." (*Op. cit.* tom. ii. p. 134.) When treating of a process in which the functions thus characterised are so signally altered, it is surely wise to apply to it the prudent caution elsewhere inculcated by himself: "Loin de moi d'exagérer l'importance des explications physiques pour l'interprétation des phénomènes dont l'economie est la siège." (*Op. cit.* tom. i. p. 202.) And as it is not likely that these simply physical explanations of this the most general and fundamental of all morbid actions, will ever have an abler advocate, it is important to state briefly the considerations which seem to us clearly to indicate, that mere mechanical obstruction in the capillaries, and mere chemical changes on the blood, whether preceding or following that obstruction, cannot suffice for the explanation of the phenomena of inflammation, as understood in our time, any more than when the theory of obstructed vessels, as laid down by Boerhäave, was opposed and refuted by Cullen.

1. If the mere circumstance of obstruction of the capillaries, and "arrêt de la

circulation" at a small spot, were an adequate cause of inflammation, extending, as we so often see it do, to a distance in all directions from the part injured, we ought to have inflammation in every case of such obstruction, *e. g.* where a vessel is tied or otherwise obstructed, so as to lead to very unusual distension, first of the larger vessels communicating with it, and then of the small capillaries into which they ultimately divide; which we know, not to be the case. It may be said, that it is only obstruction of capillaries themselves that can thus derange the capillary circulation; but it is easy to produce examples to show, that there may be much obstruction of capillaries without inflammation, and that when inflammation is excited by any cause which obstructs the capillaries, its extent and intensity bear no proportion to the degree of obstruction in which it originates. Thus, it is stated by Magendie (tom. iii. p. 431.), that the prick of a pin excites inflammation on a membrane, only when it causes effusion of blood, and so deranges the circulation in the capillaries. But how often do we see considerable effusions of blood on the tunica conjunctiva of the eye, which must obstruct many capillaries, but are nevertheless gradually absorbed, without exciting any inflammatory appearance or effusion around them; while, on the other hand, a prick of a needle causing little hæmorrhage, or a grain of sand producing none, may excite violent inflammation, the extent and intensity of which will depend on various conditions, quite unconnected with the original derangement of the capillary circulation. In every case of apoplexy of the lung, there must be absolute obstruction of very numerous capillaries; but in many such cases there is no inflammation excited around the blood effused; and in equally numerous cases there is extensive inflammation of the lungs, when the existence of any cause capable, on merely mechanical principles, of obstructing the capillaries, is, to say the least, quite hypothetical. Nay, it appears from many experiments of Magendie himself, as well as others, that the circulation may be obstructed in the capillaries to such a degree as to cause death of the part, without inflammation necessarily preceding it; for by injecting animal charcoal into the crural artery of a dog, so as to choke up the capillaries, he found that he could produce complete gangrene of the limb within forty-eight hours, and he ridiculed the idea of this gangrene being the result of inflammation running into that termination within that time. (tom. iii. p. 395.)

Again, while in these cases there is obstruction without inflammation, we can give instances, on the other hand, of bloodvessels in a state of inflammation where there can be no obstruction. Indeed two facts of this kind, already stated as to inflammation, seem to be quite beyond the reach of the mechanical explanation, viz. the doubled or tripled quantity of blood *transmitted through* an inflamed limb in a given time, and the extension of inflammation from one fold of membrane to another lying contiguous to it, but *fed by other vessels*, — from the pleura pulmonalis to the pleura costalis, from the mucous membrane of the gums to that of the cheek, &c.

2. Even if it were proved that the chief symptoms of inflammation are merely the mechanical results of obstruction of the circulation in the capillaries, we should not be entitled to deny the intervention of the vital properties of the part in producing the phenomena, unless we could explain, on mechanical principles, how that obstruction of the capillaries is brought about. Now how can we conceive that the merely mechanical action of a grain of sand, or of a still more minute particle of the matter of gonorrhœa, on the conjunctiva of the eye, should so obstruct the capillary circulation there as to cause all the congestion and effusion which is seen in acute ophthalmia, while it produces no such effect on the living membrane of the mouth, or of any part of the alimentary canal? Still more, how can we conceive that cold applied to the surface of the body should, on merely mechanical principles, determine an extensive, permanent, and fatal obstruction of the capillaries, in one distant internal organ only?

3. If these difficulties were got over, it still remains to be shown, on mechanical principles, how the obstruction of the capillaries can produce the most

characteristic of the phenomena of inflammation, *i. e.* the effusion from the vessels, not merely of serum as in dropsy, or of blood as in hæmorrhage, but of the *liquor sanguinis*, holding in solution a much larger proportion of fibrin than in other parts of the body :—how this effused fibrin can first show an unnatural degree of aggregation and density, and afterwards become vascular and organised; and how the properties of the whole blood, the relation of its colouring matter to its fibrin, and even the relative proportion of its constituent parts, can become altered, apparently by passing through the vessels of the inflamed part. Any account of the phenomena in question, which does not touch these characteristic changes, may be an explanation of swelling and redness, but is no explanation of inflammation.*

4. If we suppose the mechanical explanation of the origin and progress of inflammation to be satisfactory, no explanation is attempted, nor is it easy to perceive how any can be given, of the gradual decline, which is equally a part of the history of the disease, as it is of all excitement or increase of action that are strictly *vital.* Why should the globules of the blood, when they have coalesced and stagnated, and filled and distended the capillaries, gradually separate, and get into motion again ; and why should the capillaries shrink to their former dimensions ? If it be said, that the increased impulse *à tergo* forces forwards the stagnating blood, the obvious answer is, that the resolution of the inflammation is greatly promoted by the loss of blood, and by weakening the heart's action, *i. e.* by lessening the impulse *à tergo.*

If again it is said, that the capillary vessels, after a time, regain their power of contracting on and propelling the blood, the answer is, that the vessels in question possess so little contractile power, that even in their undisturbed state they are dependent, as Magendie has shown, on the coagulating property of the blood itself, for any power which they possess of retaining it within their own area.

5. Even if we suppose, that all the phenomena of one form of inflammation can be explained on the simply mechanical principle of obstruction of the capillaries, the theory will still be quite insufficient if it does not extend to the varied forms of which the same general series of phenomena is susceptible ; the rapid extension of the disease in one case, and its limitation in another ; its early maturity and decline in one case, and its obstinate persistence in another ; its resulting in the effusion of plastic lymph which quickly becomes vascular in one case, and in the effusion of purulent matter only, incapable of organisation in another,—both being products foreign to the usual condition of the part inflamed, and incapable of being formed otherwise than by a mysterious agency of living textures.

It will be observed, that these considerations are all founded, not on speculation, but on observed facts, at least equally well-ascertained, and equally guarded from fallacies, as any that can be observed in experiments on animals. To leave them out of view, in forming an opinion of the nature of inflammation, is to reject, not the aid of hypothesis, but the evidence of facts. We do not say that we explain these facts by saying that inflammation is a vital phenomenon, of which the explanation must be sought only in the laws of life; but we make the first step to the proper explanation, when we place the phenomenon in its proper class among the subjects of human knowledge ; and from the facts now stated we infer, with perfect confidence, that any mechanical explanation of the kind in question can only reach a part, and not the most characteristic part, of the phenomena of inflammation ; and that, in this as in other

* Magendie himself observes, quite correctly, as to the coagulation of the blood, " La véritable cause de ce phénomène doit être cherchée dans l'absence du contact entre le liquide et les parois de ses tuyaux. Qu'elle est donc cette harmonie si parfaite dont le dérangement entraine de si graves conséquences ? Je l'ignore. *Elle dure avec la vie et l'éteint avec elle.*" (tom. iii. p. 257.) This is asserting that the coagulation of the blood is a vital phenomenon. And if so, is it not almost self-evident, that when we find the coagulating part of the blood so much altered, in its proportion to the other parts of the blood, and in properties as it is in inflammation, the process by which that alteration is effected must be likewise a vital one ?

instances, all attempts to resolve the most essential changes which go on in the living body, into the laws of dead matter, "can only tend to perpetuate false views in physiology, and to draw us off from the proper point of view, in which the actions of living bodies should be regarded."

II. The next question is one on which there may be some difference of opinion among British pathologists. It is, whether the phenomena of inflammation can be explained by alteration of the *vital powers of the vessels* in which the blood moves, or whether they must be chiefly referred to alteration of other powers, influencing the condition and the motion of the blood in the living body, but independent of any contractions of living solids?

In considering this question we may first state, that if inflammation depend only on alteration of the vital power of contracting solids, these solids must be the vessels, to the exclusion of the heart, all the characteristic phenomena being often observed when the heart's action is unchanged; and we may next affirm, that the only vital properties which experiments authorise us to ascribe to any vessels is the power of tonicity, as defined and illustrated by Parry, which mainly cooperates with and augments the effect of their elasticity, causing them to contract when emptied of blood, and to remain contracted for life; and which seems to be itself augmented on certain occasions, as is shown by their contracting on a stimulus, and remaining contracted until the effect of the stimulus is over, or is counteracted by some other cause.

It is quite obvious, that any *increased* exertion of this power in the arteries, particularly if commencing in the capillaries and extending backwards, must impede and obstruct the passage of the blood: simple and decisive experiments were performed by Haes and by Wedemeyer, in which stimulating liquids were injected into arteries, and, following the course of the circulation, must have exerted their chief effect on the smaller branches of these vessels, and were found to be transmitted into the veins much more slowly than the blood itself, or mild liquids injected into the arteries.

As we have stated that one of the leading phenomena of inflammation is an increase, not only of the quantity of blood in the small vessels of the whole part affected, but of the quantity transmitted through them in a given time into the veins, there is a manifest presumption, that the general condition of the vessels concerned in inflammation must be the reverse of that state of permanent tension, which a stimulus acting on living arteries is found to produce. Accordingly it has been long known, that the capillary vessels, and small arteries of an inflamed part, appear under the microscope distended and motionless.

We need not enter on the question, whether the smallest capillaries of most textures of the body have any contractile coats at all; but it is quite certain, that when they are in this distended state, there can be no spasm or contraction exerted by such coats as they possess capable of maintaining the distended state of the vessels behind them. And in a series of observations made in Edinburgh on the arteries leading to inflamed limbs in horses, at different parts of their course, and at different periods of the inflammation, it always appeared that these vessels possessed less of the only vital power which experiments authorise us to ascribe to them,—that they had less power to propel their contents, and contracted less, at the moment of death,—than those of the opposite sound limbs. (*Transactions of British Association*, 1834-5.)

It may be a question, whether this general state of relaxation and distension, which appears clearly to be the condition of all the vessels connected with an inflamed part, is or is not the effect of an increased exercise of their tonic power of contraction in the very commencement of the diseased state. Into this we need not enter. It is sufficient for us to know, that during the whole time when inflammation, and effusion consequent on it, are most distinctly going on, the condition of all the vessels leading to and passing through the inflamed part, is one not of constriction but of relaxation; and the question before us is narrowed to this,—Does that state of relaxation afford a sufficient explanation of the changes which take place in inflamed parts?

Now it may be admitted that a general relaxation of the arteries and capillaries of any part of the body, giving increased effect to the impulse from the heart, is an adequate cause for the increased transmission through the vessels of that part, for the apparently increased action of the arteries leading to it, and the increased propulsion of blood from them when they are punctured. But it seems absolutely impossible, that the single cause thus assigned should embrace the two opposite phenomena which are presented by the blood in the vessels of an inflamed part,—viz. the increased velocity and increased transmission of blood in these vessels on the whole, and the retarded motion or absolute stagnation in those points where the inflammation is at its height. On the supposition, that the only truly propelling power acting on the blood is the heart, and that increased local determinations of blood depend only on local diminution of the resistance offered by the bloodvessels, we can understand that where this resistance is much diminished, the blood should pass through in increased quantity; but we cannot understand that where this resistance is least of all—where the vessels are absolutely passive,—there the opposite change should take place, and the blood cease to pass through at all. If the heart's action is rendered more efficient in one set of vessels by a diminution of their own tonic power of contraction, we cannot possibly admit that it can be rendered altogether inefficient in another set of vessels, merely by a further diminution of that same power; nor indeed will the total loss of that tonic power enable us in the slightest degree to comprehend this total loss of efficiency of the heart's actions, and consequent stagnation of the blood.*

But if we cannot ascribe the changes in the *motion* of the blood in inflammation to alteration of the contractile power of the vessels, still less can we ascribe to that cause the other changes essential to the state of inflammation—the effusion from the bloodvessels of the liquor sanguinis with an increased proportion of fibrin, the consolidation and organisation of that effusion, the conversion of part of the constituents of the blood stagnating in the part, both in the vessels and out of them, into the new secretion, or rather excretion, which we call purulent matter,—in short, any of those characteristic phenomena by which alone we distinguish inflammation from local terminations and congestions of blood, constantly occurring in the system, but consistent with health, or even necessary to life.

We may observe in particular, that two distinct and apparently opposite changes are distinctly referrible, in different cases, to inflammation as their cause—extravasation of certain matters, and ulcerative absorption of others. On the supposition, that the power moving the blood through an inflamed part is simply the impulse from the heart, more or less altered by passing along the arteries, and modified in its effect at the part in question only by mechanical causes, especially by some obstruction in the capillaries, we can understand that when the impulse is greater than natural, extravasation should take place, and that when it is less than natural, there should be unwonted absorption. But this theory is perfectly inadequate to embrace the opposite phenomena, viz. rapid inflammatory extravasation when the impulse is feebler than natural, and rapid ulceration when it is stronger than natural. Yet experience shows, that both these phenomena occur frequently, as effects of inflammation,—the former in cases of diffuse inflammation of the cellular substance or of the peritoneum, in the nearly latent pleurisies succeeding fever or small-pox, &c.; the latter in cases of phagedenic ulceration. It is quite certain that neither the amount of effusion nor the amount of absorption, consequent on inflammation, bears any fixed relation to the degree of impulse with which the blood is sent through the inflamed parts.

* We speak here of inflammation occurring, as it so often does, without previous obvious mechanical obstruction to the flow of blood through the capillaries, or any impediment to that flow, but that which results from the existence of the inflammation itself, and forms one of its own phenomena.

We are thus led, by ascertained facts and, as we believe, irresistible inferences from these to the conclusion, that inflammation and its effects are inexplicable by any alteration of the contractile power of the living solids concerned in it; and necessarily imply an alteration of vital properties, by which the constitution of the blood, its relations to the surrounding textures, and its movement through them are determined, but which are quite distinct from any contractions of living solids. That such living properties exist, that they effect the changes taking place at *insensible distances* among the particles of the blood, and that they are altered in inflammation, will hardly be denied by any pathologist of the present day. That they are capable of affecting the *visible* motion of the blood, will appear a rash assertion only to those who have not accustomed themselves to consider the evidence by which it is supported.

In fact, inflammation is only one of a number of cases, of constant occurrence in the animal economy, where some peculiar cause (commonly, but vaguely, called a stimulus) is applied to the capillary vessels of one part of the body, and determines an increased flow of blood towards, and increased transmission through that part, *i. e.* the opposite effect to that which experiments in the application of stimuli to arteries would lead us to expect. Whether we apply to such cases the adage " Ubi stimulus ibi fluxus," or use the term "adfluxion," or " movement of turgescence," or " solicitation of fluids," or speak of a vital erection of vessels, they all present a phenomenon which must be studied and understood before an accurate notion can be formed of many leading facts in the history of the living body, in health and disease. When air is admitted into the cells of the lungs, when food is received into the stomach, when a strong impression is made, or sensation excited in any organ of sense, when an embryo begins to grow in the uterus, — this increased flow into those capillary vessels where an impression is made by these causes, is immediately perceived, and is essential to the important changes which follow, one result of which changes, in several of these cases, is an alteration of the constitution of the blood itself. In all these instances, as well as in that of inflammation, it is impossible to ascribe to the stimulus, which produces what we call the increased action of the part, any power of exciting the only vital power (that of tonic contraction) which the bloodvessels of that part possess; on the contrary, we might be disposed to ascribe the determination of blood to the impression made at the extremities of the vessels, causing relaxation of them, generally giving increased effect to the impulse from the heart; but this theory is at once checked by two simple considerations: *first*, that a stimulus, such as air, applied to any single vessel or set of vessels causes constriction, and should therefore impede the transmission of these fluids, instead of promoting it; and *secondly*, that in extending our views to other living beings, we find precisely similar " movements of turgescence " excited by similar impressions on capillary vessels, in the lowest animals, and in the whole vegetable kingdom, where there is no heart, and where the existence of any cause of motion, acting on the principle of impulse from behind on the moving fluids, has never yet been proved. These facts afford a strong presumption, that in all these cases the impressions made on the capillaries, and on the blood contained in them, solicit the flow through them on the principle of *a vital attraction of the blood*, rather than of relaxation of the vessels.

It would be out of place here to go into details on the other phenomena of living bodies by which this conclusion may be supported; but we may briefly state the following grounds for the belief, that the fluids in living bodies are subject to a cause of motion, peculiar to the living state, but independent of the impulse of living solids: —

1. The movements of the sap in vegetables are equally essential to their life, and minister to the same functions of nutrition and secretion as in animals, yet no contractions of solids by which this motion can be explained have been detected; and, in the cases where the cause of the motion of the sap has been most carefully investigated, it seems well-ascertained that no such contraction

exists. The observations of Du Trochet seem clearly to prove, that the power of imbibing fluids resides in the spongioles at the ends of the roots of vegetables, and that its exercise is unattended with any movement of the substance of these spongioles. And in the case of the Chara, and other cellular plants, where the motion of the globules contained in the sap is so easily perceived, it seems nearly ascertained, particularly by the most recent observations of the same author (*Ann. des Sciences Naturelles*), that the cause of the motion of the fluid resides, indeed, in the granular matter which lines certain portions of the sides of the elongated cells composing the plant, but that the power which this matter exerts is of the nature of attraction and repulsion, certainly not of contraction and impulse.

2. The same observation applies, in all probability, to the very similar movements of fluids in various of the lowest of the animals—in sponges, in the polypes called tubularia and sertularia, and in many animals, considerably higher in the scale, in which the circulation is wholly or partially of the kind called *diffused*, *i.e.* not confined to vessels. That the movement in some of these cases may be attended by, or even dependent on, the impulse of *ciliæ*, is very possible; but the case of the sponge and the chara are sufficient to show, that certain forms of living matter can impress a regular progressive motion on fluids independently of such impulse; and the latter case (as lately explained by Du Trochet) may even induce us to suppose, that the power of contraction resident in living solids is only a particular mode of exertion of those vital powers of attraction and repulsion which subsist both in certain portions of all living textures, and likewise in the "chaire coulante" of living fluids.

3. In the commencement of the existence of all animals, as certain definite forms are assumed by the germinal membrane and the semi-fluid granular matter in contact with it, so certain definite moving powers must not only have been exerted before the existence of heart, or arteries, or blood, or of any texture capable of contraction, but must have been the essential cause of the existence of all these things; and, at a considerably later period of the existence of the embryo of vertebrated animals, there is no moving power, acting in the way of contraction and impulse, to which we can ascribe that continued entrance of the fluids contained in the uterus into the filaments of the spongy chorion, which is essential to the growth of the whole ovum.

4. At all the later periods of the existence of the higher animals, there is one set of vessels contained in them, into which fluids are introduced, and in which fluids are moved, steadily and forcibly, in a manner wholly inexplicable by any power of contraction which experiments authorise us to ascribe to the vascular coats, viz. the absorbent vessels, which are now generally believed to have no open mouths, and in which no contractile powers have ever been detected, except such as we have ascribed to arteries, and any exercise of which, as in the case of the arteries, would necessarily *retard* the passage of a fluid.

5. While it seems perfectly ascertained, that the exercise of the only vital power of contraction resident in arteries must be an additional impediment, instead of an auxiliary, to the heart's action in keeping up the circulation, it has long been observed, that the various obstacles opposed to the motion of the blood through the small arteries, and the very moderate degree of pressure, by which (as Sir C. Bell justly observes) the impulse of the blood in the larger arteries may be arrested, render it highly probable that some auxiliary power cooperates with the *vis à tergo* to maintain the flow through the capillaries. And this probability becomes almost a certainty when we advert to the effect of a ligature on a large artery, which uniformly leads to distension, not of the obstructed artery, but only of the collateral branches, and to shrinking and collapse of the portion of artery which intervenes between the ligature and the last branches *above* it,—the blood gradually deserting the trunk of the artery, and entering those branches only, by which it can be conveyed to capillaries where vital actions are in progress. This desertion of the portion of an

artery above an obstruction, and seeming preference of anastomosing branches, is not only ascertained by subsequent examination of the state of the parts in such cases, but has been witnessed on a small scale under the microscope by Haller and other observers.*

6. A very careful microscopical inspection of the phenomena of the capillary circulation led Haller long ago to the conclusion, that it is "de toute nécessité" to admit the existence of a cause of motion there, to which he gives the name of attraction, independent of the contractions of the heart or bloodvessels. This conclusion has been adopted by most subsequent microscopical observers in Germany, and although it has been opposed by the authority of Magendie and of Poiseuille in France, yet it may be confidently asserted, that no satisfactory explanation has been given, on any other principle, of some of the facts on which it is rested.†

7. Physiologists are now generally agreed, that the phenomena of the coagulation of the blood, and the varieties to which that process is liable, imply the existence of certain living properties or powers in the fibrin, and particularly of a peculiar attraction or tendency to aggregation in the particles of that substance, under certain circumstances. And of the importance of this living property to the circulation of the blood, we are well-assured by the recent and important experiments of Magendie, in which it appeared, that when the blood is in a great measure deprived of its fibrin, or when the coagulating property of that constituent of the blood is destroyed by the addition of alkali, the circulation in the capillaries can no longer be maintained;—this preternaturally fluid blood (although hardly, if at all, inferior in density to healthy blood) being extravasated from them in various parts of the body, and particularly in the lungs, nearly as it is in many cases of malignant fevers. Now, knowing, as we thus do, that the presence and the coagulating property of the fibrin constitute the power by which the blood is retained in the vessels in the natural state of the circulation, when we meet with a case where the blood in one portion of the body undergoes such a change, that the quantity of its animal matter taking the form of fibrin, and the tendency to aggregation of this matter are increased, should we not expect to find the blood accumulate in that part of the body, coming under the influence of a peculiarly augmented principle of attraction there, equally as we know that, when the heart's action is very feeble, it will come under the influence of the principle of gravitation, in any part of the body?

From all these facts we think ourselves justified in inferring, that inflammation consists essentially in a local increase of a vital property of attraction existing among the particles of the blood, and between them and the surrounding textures. This increased attraction seems to take place both among the particles of the fibrin which are in union with the serum in the living vessels, and in those particles of nearly similar matter which constitute the bodies of the

* We lay no stress on the instances on record, of the fœtus coming to a considerable size without a heart, because we have no well-authenticated case, in which such a fœtus has existed alone in the womb, *i. e.* in circumstances precluding the possibility of the circulation being maintained by help of the contractions of the heart of a true fœtus; but it is right to mention, that cases of the kind have occurred, in which competent observers have doubted that any such assistance was given to the circulation in a fœtus without a heart. (See Graves, in *Dublin Journal.*)

† We may mention, in particular, the observations of Haller on blood escaping from vessels between the layers of a living membrane, and nevertheless pursuing its course in a regular stream for a time, even against the influence of gravity, and his observations on the regular oscillations of globules in limited portions of small vessels. On this last phenomenon Poiseuille asserts, and Magendie agrees with him, that it is to be ascribed to the impulse of the heart's action, and the resistance of the bloodvessels, even although taking place in vessels the coats of which are not seen to contract, and which are not seen to communicate with any of the larger vessels, *because it is found to be synchronous with the heart's action.* (Magendie, *Leçons, &c.* tom. iii. p. 275.) But this explanation is wholly inapplicable to the case, repeatedly noticed by Haller, by Kaltenbrunner, and others, in which these regular oscillations go on, particularly in the neighbourhood of inflamed parts, *long after the heart is at rest, or has been cut out of the body.* (See Haller, *Mém. sur le Mouvement du Sang, Ex.* p. 222. et seq.; Kaltenbrunner, in *Journal de Physiologie*, tom. viii.)

globules; the increased aggregation of both being characteristic of inflamed blood.

The increased flow to the inflamed part, and probably the gradual relaxation of the vessels leading to it, are the consequence of this alteration, just as the acceleration of the flow of blood through the lungs, on the admission of air there, is the consequence of the changes, partly chemical but partly vital, thereby brought on the blood; or as the increased flow to the uterus during gestation, to the stomach during digestion, or to any secreting organ to which a stimulus is applied, is the consequence, not the cause, of the vital changes to which the blood in these organs is subjected on such occasions. When the vital properties of the blood and its relations to the living solids shall have been more carefully scrutinised, this proposition will acquire more precision; but even at present it is obvious that we assert nothing which is not susceptible of demonstration, in asserting, that such a vital power of attraction or aggregation among certain particles of the blood exists in the natural state; that it is the cause of the coagulation of the blood, *i.e.* that it is the cause of any portion of the constituents of the blood taking the form of fibrin; that it is concerned in regulating the circulation in the capillaries; and that it is materially augmented in an inflamed part, as appears both from the larger quantity of the blood which takes the form of fibrin, and from the greater aggregation of the fibrin itself, both in the blood in the vessels and in the matter extravasated there. And thus it appears sufficiently ascertained, that the afflux of blood to the inflamed part, its stagnation there, and the most important of the changes which it undergoes, are included in this general proposition, that the fibrin contained in the blood in that part of the body, is affected, during the state of inflammation, with the very same change of property to which, when we see it in the fibrin that constitutes the bulk of muscular fibres, we give the name of rigidity or tonic spasm.

Having dwelt so long on the intimate nature of inflammation itself, we may state in a very few words all that physiology can teach us of the nature of the changes described as its *natural effects*. These effects must be regarded, indeed, at present, as nearly ultimate facts in pathology, and we have already referred to them as illustrating the nature of the change from which they result. Instead of attempting an explanation of them, pathologists are more disposed to refer to them as principles serving to explain other and less familiar phenomena.

When we see the lymph thrown out of vessels in the state of inflammation, gradually become concrete, take the form of flakes, and then of membrane, and then form elongated cells into which the blood of the neighbouring textures is received, and in which it continues its motion, all we can say is, that this lymph exhibits vital properties somewhat similar to those by which the original organisation of the germinal membrane of the egg is determined. But it is important to observe, that this vital property resides in that effusion only, which takes place from the vessels during inflammation, and even during inflammation of a particular character and in a particular stage. For, notwithstanding some doubts which have been expressed on the subject, it seems nearly ascertained, that neither blood itself, nor any other effusion from uninflamed vessels, nor purulent matter, nor the effusions from certain varieties of inflammation (*e.g.* scrofulous or erysipelatous) are capable of thus becoming vascular and organised. And, in fact, the useful purposes which inflammation serves in the animal economy depend essentially on this, that it is the process by which portions of the blood are prepared for the vital changes by which they are to close wounds, and repair breaches of texture.

Again, when we see the yellow globules of pus gradually mixing with the other exudations in an inflamed part, and often aggregating together towards the centre of these effusions, we can only say, that another vital change, besides the deposition from the bloodvessels of an unusual quantity of one of the natural

constituents of the blood,—that a new secretion, or rather excretion, because destined to discharge from the body, is established. The observation of Mr. Hunter, that in external parts this effect of inflammation is favoured by exposure to air, and the effusion of plastic lymph only by seclusion from air, is almost the only circumstance we can mention as affecting the formation of this product. But it is important to bear in mind, that according to the observations of Gendrin, the formation of pus takes place within the vessels of an inflamed part, as well as in the matter which escapes from them; that, according to Andral, distinctly purulent matter has been found within the coagula in the large vessels or heart, where there has been no abscess or suppurating surface in the body; and that, according to Mr. Gulliver, when inflammation has lasted some time in any important organ, globules of pus may be recognised in the blood. (*Phil. Trans.* 1838.) The importance of these observations, the importance also of marking the tendency to the early formation of pus, as indicating a peculiar form of inflammation, will be noticed afterwards.

Mr. Hunter puts the question with much earnestness, "What is the use of the secretion of pus?" and confesses himself unable to answer it. We may approximate, at least, to an answer by observing, that as all living action, without exception, is attended by the formation of fluids, which if retained in the living body act as poisons, so the locally increased and altered living action of inflammation, when of a certain duration, is subjected to the same law, and can only terminate favourably by the expulsion of the excretion which is thus formed. We shall afterwards see, that it is at all events a fact, that whenever purulent matter is directly mixed with the blood, it acts on the system as a poison.

When we see an ulcerated surface extending itself around an inflamed and suppurating part, we can only say, that in consequence of the continuance of inflammation,—in many instances in consequence of pressure, or of continued external irritation, maintaining and extending the local inflammation (in general without exciting the system at large),—the vital process of absorption, always usefully active where inflammatory effusions are of some standing, has extended to a part of the previously existing textures.

Mr. Hunter showed, that there may be great effusions of pus without any ulceration; and again, that there may be much breach of substance and change of form in the solids of the body by absorption, as from pressure, without effusion of pus; and hence he inferred, that the loss of substance in ulceration is always to be ascribed to absorption only,—never in any degree to solution of the solids in the pus or ichor of the sore. But Mr. Key has made it probable that this inference was too hasty, and that a solution, at least partial, of solids in extravasated fluid does in general precede their absorption (*Med. Chir. Trans.* vols. xviii. and xix.); and this indeed, according to Dr. Prout, would seem to be a preliminary condition to all absorption of portions of the living body itself, whether in the living or dead state.

The agents employed in this absorption are now generally believed to be the veins, at least as much as the lymphatic vessels; but according to the most recent anatomical researches, both these sets of vessels are filled in the same way, viz. by lateral transudation. The commencement of ulceration, as an effect of inflammation, implies merely that the attraction by which extravascular matters are constantly taken into the small veins preponderates over that by which portions of the blood pass out of the capillaries. Some observations of Mr. Key seem to show distinctly, that by this attraction part of a living texture may be made to enter the vessels of a membrane lying contiguous to that texture, but supplied with blood from a different source. (*Med. Chir Trans.*)

Lastly, when we see mortification and sloughing succeed after a time to the previous changes in inflamed parts, we can do no more than state the fact, that the change of vital properties in the stagnating blood, and in the textures in which it stagnates, is naturally succeeded, after a certain time, by the loss of all vital properties. It has been thought, that this is sufficiently explained by

the mere circumstance of absolute stagnation of the blood necessarily arresting all the living functions, and thereby allowing of putrefaction, first in the blood, and afterwards in the surrounding textures; but it is very doubtful whether this explanation is sufficient. It is true that in the experiments of Cruveilhier and Magendie the injection into an artery of a living animal, of mercury and charcoal, or various other substances which, when they arrive in the capillaries, choke them up and arrest the circulation, was followed by rapid gangrene of the limb,—complete, in one of the experiments of Magendie, forty-eight hours after the injection. And it is also true, that gangrene occurs as a consequence of inflammation chiefly in those cases in which the general circulation is so enfeebled, that absolute stagnation of blood in the inflamed parts may be supposed to be much more easily produced than in the natural state, *e.g.* where the inflammation is complicated with the depressing effect, on the capillary circulation, of concussion (as in what is called traumatic gangrene), or of extreme cold, or of powerful animal poisons, or typhoid diseases. But we see, every day, in cases of ligatures applied to the larger arteries, or of obstructions from various causes occurring there, just as in the case of aneurisms,—and we know that in experiments, where portions of blood have been inclosed between ligatures on the vessels of living animals,—that the blood in the larger vessels may stagnate and remain perfectly at rest for a long time without putrefying, and therefore we cannot regard its stagnation in the small capillaries as a sufficient cause for its putrefying so rapidly as it does in many cases of gangrene. And in attending to cases of inflammation running to gangrene from the causes above stated, we may often see this event take place where there is neither such extreme depression of the circulation, nor such intensity or endurance of the inflammation, as to entitle us to suppose that the blood is more completely or longer stagnant in the inflamed part than in other cases where no such result follows. We may presume, therefore, that the death of the blood, and of the textures surrounding the blood, in inflamed parts, is an effect, at least in part, of the previous changes of them during the state of inflammation,—not merely of the cessation of movement;—and that, in the experiments above noticed, the rapid accession of gangrene ought to be ascribed, not merely to the circulation being stopped in the capillaries, but to the minute structure of the blood being injured by the mechanical means employed, and its vitality, therefore, suddenly destroyed.

The loss of vitality in an inflamed part has been compared to the loss of vital power in a muscular part violently exercised, and of which, according to the usual but metaphorical expression, the irritability has been exhausted. But the explanation thus attempted is not at all satisfactory, because we cannot assert that the tendency of inflammation to gangrene bears proportion to any observed increase of vital properties of inflamed parts, in the earlier stages of the disease.

In the greater number of cases, indeed, in which we see gangrene succeed to inflammation, it is certain either that the inflammation is of a specific character and attended with typhoid fever, (as in plague, cynanche maligna, the bad form of measles, or small-pox, or erysipelas, &c.), or that it coexists with another disease, or with the influence of some other agent on the body, as when it attends continued fever, or succeeds to the effect of a violent concussion (constituting the traumatic gangrene), or occurs as a sequela of some of the contagious febrile diseases, or as an accompaniment of some debilitating chronic disease, as palsy, dropsy, or scurvy, or as, in part, an effect of diseased arteries. In all such cases the concurrence of a peculiar debilitating influence in the circulation, with the inflammation, may be recognised; but in several of these it is pretty certain that this debilitating influence acts, not merely by enfeebling the solids by which the blood is propelled, but by modifying the constitution of the blood itself, and rendering it more prone to death and to putrefaction, than it otherwise would be.

The excitement of general fever by local inflammation must also be regarded

as a general fact in pathology, more susceptible of application to the account we are to give of other facts, than of explanation in itself. Yet there are some principles in this fundamental department of pathology which may be stated with confidence, and which it is really of importance to keep in mind.

1. We may set aside entirely the supposed intervention of a vis naturæ medicatrix in this as in all other cases when we attempt to give an account of diseased conditions of the body; — not because there are not many of them, in which a wise and benevolent design may distinctly be traced, but because the reference to this design does not explain *how*, but only *why*, any particular changes happen. It is an introduction of final causes, into an investigation of which the object is the determination of physical causes only; and the speculation is rejected, not as false or unphilosophical, but simply as misplaced.

2. We may set aside also the idea of the general febrile reaction being really effectual in resolving the local inflammation, because we know that the resolution of the inflammation often takes place when the violence of the fever is over; and is often obviously promoted by means which greatly lessen the action of the heart.

3. We cannot give an opinion with equal confidence as to the notion of a spasm of the extreme vessels being excited, when fever supervenes on local inflammation: we know that, during the greater part of inflammation, the condition of all the vessels of the affected part is one of relaxation and weakness, not of constriction, and we must regard it as very doubtful whether the true capillaries, in any texture, are capable of spasm. But many observers agree, that an unusual constriction of the vessels of a part becoming inflamed may be perceived when the disease is beginning, and the notion of Hoffmann and Cullen, as to the extension of this preliminary state of the vessels over the system at large, is a plausible conjecture. We must at all events observe, that the phenomena which were considered by them as indicating spasms of the extreme vessels, the diminution of excretions of the skin, the bowels, and the kidneys, as well as of the functions employed in digestion, and the suspension of the function of nutrition, are real and important: they indicate that many of the vital actions going on in the capillary vessels are deficient during the febrile state; they justify the inference that the blood in this state does not circulate so freely, through many of the small capillaries, as in the healthy state, and probably is returned in larger quantity to the heart by the larger of those small arteries which communicate with veins*; and this temporarily obstructed state of the capillary vessels may certainly be regarded as an adequate cause of the temporarily increased action of the heart during fever, just as a permanently obstructed condition of the aorta is universally regarded as an adequate explanation of the permanently excited action, and ultimately of the hypertrophy, of the heart in chronic disease.

Two questions, neither of which we have any reason to suppose insoluble, remain for solution, before we can give any satisfactory account of the febrile state, as excited by inflammation: — 1st, Whether the deficient condition of the vital actions in the capillaries is owing merely to a general constriction of the smaller arteries, or whether the auxiliary vital powers, of which we have spoken as in all probability influencing very much the fluid in the capillaries, are here primarily deranged; and, 2dly, Whether the general derangement of the vital actions in the capillaries over the body is to be ascribed to the change on the blood in inflammation, or whether an influence of the nervous system is essentially concerned in producing it. It may be stated, that the presumption

* It was ingeniously suggested by the late Dr. Fletcher, that if all inflammations commence, as microscopical observations seem to show that some of them do, by constriction of the vessels immediately concerned, we have only to suppose this condition extended to the small vessels generally, to produce that state of the capillaries which seems characteristic of fever; and which over the system at large, may very well be supposed to coexist with the relaxed and distended condition of the vessels actually inflamed. (See *Dysdale's Inaugural Dissertation on Theory of Inflammation*. Edin. 1838.)

is strongly in favour of the latter of both these alternatives. It appears pretty certain, that the great increase of the vital actions among the particles of the blood at the inflamed part is attended with a diminution of the usual vital actions in the other capillaries of the body; and likewise that the impression produced on the nervous system, by the existence of this diseased state in any one part, is an important agent in the transmission of the morbid influence to other parts of the body; but in the absence of decisive evidence it is perhaps better to decline pursuing the subject further

Causes of Inflammation. We go on now to a branch of the subject, which although not in reality of more practical importance than that which has now been discussed, is capable of more direct.practical application, viz. the *Remote Causes of Inflammation.*

It is hardly necessary to say, that the old distinction of *Exciting* and *Predisponent* causes of disease is one not merely of scholastic convenience, but of real and practical importance, particularly in reference to our present subject, and more especially, we may add, in reference to the greater number of those cases of inflammation, which come under the view of the physician. In some of these cases it must be admitted that no external cause is distinctly perceived, but in many, the disease may be distinctly traced to the operation of some such cause, the efficacy of which has been established by experience, and which might have been avoided; and in many, likewise, the concurrence of a predisponent and an exciting cause may be easily observed. To this last point, in all our attempts at prevention of inflammatory diseases, it is especially important to advert. In very numerous cases, where a predisposition to disease is beyond our reach, disease may nevertheless be long averted, if the usual exciting causes of inflammation are known and avoided; or, if disease exists, it may be ascribed to some incautious exposure or injury. In illustration of this we need only mention the case of the scrofulous diathesis, often well-marked for years, without serious disease showing itself, but disposing infallibly to a bad form of inflammation if any exciting cause be applied; or, again, the case of organic disease of the aorta or valves of the heart existing in many persons, especially if advanced in life and under a cautious regimen, for years together, without any inflammatory disease showing itself, but necessarily predisposing to intractable pneumonia or bronchitis, and to many other diseases consequent on them, unless the causes capable of exciting them are avoided.

It may be doubted whether, in the healthy state, any local inflammation is the direct effect of mere *general excitement* of the system; whether by intemperance or external heat, affecting the whole body, or exertion, or suppressed evacuations; although such excitement is a very frequent cause of aggravation, or renewal of inflammations.

The most important distinctions among the known *exciting* causes of inflammation seem to be the following:—

1. There are many which are applied directly to the part that inflames, viz all mechanical and chemical injuries or irritations (including heat) applied in a degree short of that which causes actual death of the part; and of the chemical irritants it is important to bear in mind, that none are more powerful when applied to most textures of the body than those which, in the healthy state, are constantly and beneficially applied either to the skin, protected by the cuticle, or to the mucous membranes of the body, protected by their own mucus, viz. air, solid and liquid aliments, and the excretions of the living body itself, particularly the bile and the urine.

2. There are cases where the exciting cause of the inflammation exists, not in contact with, but only in the near vicinity of, the part that inflames: as when a carious tooth excites an abscess of the gum near it, a carious joint or vertebra an abscess of the neighbouring cellular substance, &c.

3. There are cases, of rare occurrence in practice, but of importance in pathology, where the cause of the inflammation is applied, not to the part that inflames but to nerves which supply it, probably in every case to its sensitive

nerves. The most striking examples of this kind are,—the inflammation of the eye, which follows section or division of the fifth nerve, or of the sympathetic nerve; that of the lungs or bronchia, and sometimes of the stomach, which often follows sections of the par vagum; and that of the bladder, which follows such injury or disease of the spinal cord, or destroys sensibility and voluntary motion in the lower part of the body. In the most unequivocal of these cases, however, it is to be observed, that the part which becomes inflamed is a mucous membrane *; now these membranes are obviously protected against the irritating qualities of the foreign matters constantly applied to them by the mucus which they secrete, and the secretion of that mucus is very much regulated by their sensations, and must be expected to fail when their sensibility is extinguished. This explanation applies probably to many of the inflammations observed after the section of nerves, but it must be admitted to be doubtful whether it applies to all: parts, of which the sensitive nerves have been injured, or have lost their power, are certainly peculiarly liable to inflammation from slight causes, as we see in palsy and occasionally in neuralgia; and in fact, as we have reason to think that many of the exciting causes of inflammation probably act through entire and healthy nerves, so this kind of morbific influence transmitted through nerves may (under certain conditions, not yet understood) be imitated by morbid states of nerves themselves. And knowing as we do how readily, not only the movements of the blood in the capillaries of individual parts, but the vital actions going on in these capillaries, are influenced through the nerves, in the healthy state, by sensations and emotions of mind, we cannot be surprised to find that some morbid influence, coming from these nerves, should have the power to excite inflammation there.

4. The most usual exciting causes of internal inflammation are applied to distant parts—to the surface of the body, sometimes generally, sometimes partially—and take effect on individual internal parts. It is probably in this way only that cold and moisture directly excite inflammation. We mention them separately, because, although moisture has been often represented only as a more permanent, and therefore more injurious, mode of applying cold, we see continually, in cases of rheumatism, bronchitis, toothach, &c., that when the sensation of cold felt is neither longer nor more intense, the influence of moist air as a cause of inflammation is more powerful.

In cases of internal inflammation excited by external cold, the temperature of the organ that suffers is probably never reduced; the actual application of cold to any living part, although often a predisponent, is probably never an exciting cause of inflammation there. It may be a question, whether the application of cold on the surface acts merely by repressing the circulation there, and thereby increasing the momentum of the blood flowing to internal parts, or whether the impression made on the nerves of the surface, and the sensation thence resulting, form a necessary link in the communication of the disease; but when we remember the facts stated under the last head, and when we attend also to the influence of intense mental occupation or emotion (as in the case of maniacs) in fortifying the body against attacks of internal inflammation, even when the external surface is much chilled, we shall consider the latter supposition by far the most probable.

It is at all events certain, and obviously important, that the effect of external cold in exciting internal inflammation appears to be directly proportioned to the intensity and the duration of the sensation which its application produces, as will appear more distinctly when we treat of the predisposing causes.

* The stagnation and congestion of blood in the lungs, which follows section of the eighth pair of nerves, and is very generally the cause of fatal asphyxia, is not inflammation, although it often passes readily into it. It seems to depend on imperfect oxygenation of the blood; and although the precise mode, in which the operation produces this effect may still be disputed, it was highly probable that the simple explanation long ago given by Sir B. Brodie is the correct one, viz. that by the diminution of sensibility the acts of respiration are rendered slower and less effectual for their purpose. (See *Experiments of Reid in Edin. Med. Journ.*, 1837-8.)

5. Another head of exciting causes of inflammation consists of those which exist in the blood, and circulating in it are determined, often by unknown causes, to particular organs, where they excite inflammation. We have illustrations of this principle in the case of various poisonous and medicinal substances,—mercury, which acts on the salivary glands, arsenic, and many other acrids, which act on the stomach and bowels, poisonous fish and vegetables, which, in many persons, act peculiarly on the skin. The applications of this principle in disease are less certain, but obviously of the highest importance. It is thus, apparently, that various animal poisons (producing contagious diseases), absorbed into the blood, excite specific inflammation on the skin and in the mucous membranes;—it is thus, probably, that purulent matter formed within a vein and circulating in the blood often excites inflammation and rapid purulent deposition, at a distant part;—it is thus that similar purulent deposits often take place after small-pox, when much of the matter of the pustules has been absorbed into the blood; and that similar deposits in internal parts often succeed the amputation of a limb where there has been a large suppurating surface;—it is thus, perhaps, that the inflammation and ulceration of the intestines in hectic fever, connected with suppuration of other parts, are produced;—it is very probably thus, that the peculiar inflammation, and peculiar inflammatory deposits of gout are to be explained; and when it is once understood, that a morbid matter formed by inflammation, or by a process closely resembling inflammation, in one part of the body, and absorbed into the blood, may be a cause of a peculiar inflammation, and of the formation of a similar product in another part, we have a key to the facts so often observed, as to the extension over the system of tubercular disease, of encephaloid disease, and other affections often called malignant.

It will be observed that the two last kinds of exciting causes of inflammation, being applied generally over the body, or at a distance from the parts which they affect, necessarily imply the existence of some circumstance of predisposition, by which their effects are aided and determined to particular organs. It must be admitted that the nature of this tendency, either in individual persons, or parts of the body, is often unknown; but many important observations have been made on the predisponent causes of inflammation, and the most important of these may be classed under the following heads:—

1. There are certain causes which are known to *increase the tendency* to inflammation, particularly from the application of cold, or of those specific poisons which excite inflammation as part of their effects: these are, in general, *causes of debility*,—whether, according to the Brunonian language, of direct debility, from previously deficient excitement, or of indirect debility, from previous excessive excitement and exhaustion. Such are, imperfect nourishment,—deficiency of the natural stimuli of pure air and muscular exertion,—long-continued cold,—previous debilitating disease,—repeated evacuations, as by loss of blood, but still more by evacuating remedies, which have more or less of a poisonous influence, as mercury or antimony,—continued mental depression,—and, again, excessive exertion, mental or bodily, with want of the natural restorative effect of sleep,—long-continued heat,—intemperance in the use of strong liquors, or other weakening indulgences. The efficacy of these causes, in disposing to inflammatory disease, is ascertained by experience on so large a scale as to be much less liable to fallacy than the observations of any individuals; *first*, by statistical returns of the amount of disease and mortality in great towns, as compared with country districts,—in seasons of scarcity, as compared with seasons of plenty,—among the indigent classes of society, as compared with those in comfortable circumstances,—among the intemperate, as compared with the sober,—in beaten armies, as compared with victorious armies,—among depressed and disheartened individuals, as compared with those who are fortunate and flourishing;—*secondly*, by medical reports, showing how large a portion of the excessive mortality in all these cases is to be ascribed to inflammatory disease.

The experiments of Magendie, and the experience of many practical observers showing that, in cases of death, or extreme debility, brought on by starvation, the tunica conjunctiva of the eyes, and some of the internal mucous membranes, are very apt to inflame, may be stated as illustrations of the facility which is given by an enfeebled state of vital action to the excitement of inflammation.*

2. Other circumstances of predisposition may be pointed out as very frequently determining the *seat* of the inflammation, which is apt to be excited by exposure to cold, or to other exciting causes. These are very generally causes previously existing in, or acting on, the body, which produce congestion of blood in individual parts, increasing the flow towards these parts, or retarding the transmission through them, and so making them more liable than other parts to the congestion and stagnation of inflammation. Of this kind are, Cold acting on the air passages, and disposing to bronchitis in winter or cold climates, and Heat acting on the liver and bowels, and disposing to hepatitis and dysentery in hot climates and seasons; the act of Digestion exciting the circulation in the stomach and bowels, or that of Lactation, or of any Secretion liable to much variation of quantity, exciting the circulation in the mammæ or other glands, and disposing to inflammation of those parts; Organic diseases already existing in the heart, in the lungs, or in the liver, confining or obstructing the circulation, and hence producing local plethora, and disposing to inflammation in the lungs or bronchia, in the liver or in the intestines, as is seen in the numerous cases of pneumonia or bronchitis supervening on disease of the heart, or on tubercles in the lungs, of inflammation (usually chronic) and induration of the liver supervening on any organic disease within the chest, or of inflammatory diarrhœa, dysentery, or acute dropsy, supervening on disease of the liver and obstructed circulation there. To the same head of predisposing causes we refer the important fact, that previous inflammation and distension of the vessels of any part facilitates, for a long time or for life, the reproduction of inflammation in the same part,—a fact which clearly proves, that the proximate cause of inflammation, although certainly affecting the constitution of the blood, does not reside in the blood only, but primarily in the agency on the blood of the solids through which it passes in the capillary vessels.

3. Another important class of predisposing causes are those which determine the *kind* of inflammation, which cold, or any other exciting cause, may produce. Thus there is an hereditary constitution of the body, often aggravated by imperfect nourishment, by inadequate protection from cold, by a sedentary life and vitiated air, which gives the tendency to the scrofulous forms of inflammation; there is an hereditary tendency, much aggravated by full living, which disposes to gout, and one, also, which gives the tendency to bronchitis and asthma; and there is a peculiarity of constitution often resulting from habitual intemperance, which disposes remarkably to chronic inflammation and slow deposits of solid lymph in the lining membrane of the heart and arteries, in the lungs, in the liver, and in the kidneys — often to such affection of several or all these viscera in the same subject.

Existing inflammation of one organ has been set down by some systematic authors as a predisponent cause of inflammation in others. This statement does not appear to be well-founded, excepting in the case of neighbouring soft parts inflaming in connection with diseased bones, — or in that, equally manifest, in children at least, of neighbouring lymphatic glands inflaming in connection with diseased membranes in all parts of the body, — or in the few cases of inflammation (chiefly however of peculiar or specific character, as gout, rheumatism, or erysipelas) passing by *metastasis* from one

* The statement contained in many practical works, that plethora and a "phlogistic diathesis," connected with it, "give a tendency to inflammatory disease," is fallacious. Such causes give a tendency to diseases which require evacuations, but certainly not to true inflammations (excepting in the case of the specific inflammation of gout). Again, when inflammations are excited in such habits, they show violent symptoms, and demand active remedies; but this is a very different thing from their being peculiarly apt to occur in such habits.

part of the body to another. But it is probably a general fact, that when inflammation is in any way excited in one part of a body, in other parts of which it has been previously subsisting for some time, there will be predisposition to effusion of a peculiar character, and much loaded with fibrin, or even with pus, as might be expected from what has been said of the gradual alteration of the whole blood in consequence of inflammation; and this appears to be exemplified in many cases where rheumatic inflammation attacks the heart, and in a few where it attacks the lungs, and produces, within a very short time, great effusion of solid matter.

Anatomical characters of Inflammation. We proceed now to offer a very general sketch of the different forms which inflammation assumes and the effects which it produces, as it affects the different textures of the body; first, supposing the constitution on which it acts to be previously sound and healthy, and the inflammation to show what has been very reasonably called its simple or healthy character.

In *cellular substance*, healthy inflammation tends to the effusion of lymph, by which the cells are loaded, swelled, and condensed; while but little, even of serous effusion, extends beyond the part where the pain is felt. If the inflammation is intense and not arrested by remedies, the central part of the effusion soon becomes purulent, but is still bounded by a cyst, consisting of cellular substance condensed by effused lymph, and is thus prevented from diffusing itself. This cyst becomes gradually thinner, especially in the directions in which least resistance is offered to its gradual distension, by the increasing effusion of pus within it, and at the same time the neighbouring sound parts in the same direction are gradually wasted by the "progressive absorption" determined by the pressure, and thus the abscess makes its way to the surface of the body. This process is liable to great variation in different cases; sometimes the inflammation, although long-continued, never goes beyond the effusion of coagulable lymph; sometimes, although of slight intensity, it forms purulent matter early; sometimes the purulent effusion is never circumscribed by lymph; and sometimes there is rapid sloughing as well as purulent effusion; but all these may be regarded as the effects of peculiar or specific forms of inflammation, and will come under view afterwards. Partial sloughing, however, *i. e.* death of a portion of the cellular membrane, in consequence of inflammation, is an effect to be apprehended merely from intensity of the disease. This form of inflammation is clearly of the same type as that which takes place in the parenchymatous viscera, to be mentioned immediately.

The healing of wounds, whether by the first intention, or by granulations filling up the breach of texture, is generally held to be in all cases the result of inflammation, and of the organisation of the lymph thrown out by inflammation, although sometimes on so minute a scale as hardly to be distinctly recognised: the latter process is attended with effusion of pus on an exposed surface, and both are attended by an active absorption of the thinner part of the effusion on the inflamed surfaces; the new matter which is formed is always, in the first instance, a dense or compact cellular substance, but afterwards probably, in all parts in which the process can go on at all, assumes the form and vital properties of the texture in which it is formed.

On *membranous* parts there is some difference in the usual effects of healthy inflammation, but always an obvious approximation to the type exemplified in the cellular membrane. On the *skin* it leads very certainly to the effusion of serum externally, and elevation of the cuticle, but at the same time to effusion of lymph into, and condensation of, the true skin itself, and frequently affects in the same manner more or less of the cellular substance beneath. It is a mistake to suppose, that inflammation has necessarily any peculiar tendency to spread extensively along the skin; for healthy inflammation, such as is excited by burns, blisters, or bruises, has no such tendency.

When inflammation of the skin is of some duration, particularly if it is aggravated or increased by repeated irritation, it generally goes on to effusion of

pus, and often subsequently to ulceration; and in certain circumstances, to be afterwards stated, it frequently terminates in gangrene.

The inflammation of the *serous membranes* within the body, is that which shows the greatest tendency to extend itself along the surface, being rarely seen on any of those membranes, in the head, chest, or abdomen, confined to a very limited extent of surface. On these membranes it tends always to effusion of serum, which soon becomes either loaded with lymph, so as to take the form of a thin jelly if drawn from the living body, or, more generally, is found to be mixed with flakes of soft whitish or yellowish lymph, while a similar exudation of lymph incrusts the membrane itself, and gradually undergoes various important changes. This false membrane often becomes organised by the blood it receives from the arteries of the inflamed surface; and it afterwards becomes of less bulk, and of firmer consistence, in consequence of the absorption of part of its substance both into the vessels of the surface from which it came, and into the vessels (chiefly veins) which are formed within itself. This tendency to absorption in the effusions from healthy inflammation, always to be expected after the inflammation has subsided, is the essential point of distinction between these effusions and other growths or tumours, composed of materials foreign to the healthy body, and constituting the strictly organic diseases,—tubercles, scirrhus, melanosis, encephaloid disease, &c.; and it is of the utmost importance to the practitioner to understand distinctly the circumstances in which this healing process of absorption is to be expected, and the duration and extent of its operation, because it is the grand resource to which he must look in the later stages of those cases in which inflammation is not adequately opposed during the first part of its progress. This observation applies particularly to the inflammatory effusions which may very frequently be detected in the cavity of the thorax.

In many cases, where the inflammation of these membranes is of some continuance, the effused fluid assumes gradually the form of pus, as is most remarkably seen in cases of empyema, often called chronic pleurisy, but oftener the effect or sequela of acute pleurisy; but if the inflammation has been of healthy character, the purulent effusion here, as in the cellular substance, is always preceded and bounded by coagulable lymph. In this manner circumscribed collections of pus are often formed among the folds of the intestines from peritonitis.

On the serous membranes themselves, inflammation of the more chronic or less intense character has frequently a very peculiar ulterior effect—that of making them rough and uneven, and thickening them by interstitial deposition of lymph, and at the same time shortening or puckering them up. This is remarkably seen in many cases where such inflammation has affected the peritoneal surface of the liver and of the intestines, of the Fallopian tubes, &c.: it is thus that the omentum becomes shortened and thickened by inflammation; and it is the same change, consequent on inflammation, which so injuriously affects the structure of the inner membrane of the bloodvessels and of the different valves of the heart.

Ulceration, as a consequence of healthy inflammation, probably takes place on the serous or synovial membranes only after long-continued effusion, and partly in consequence of the pressure of the effused fluid; but it is often observed in these circumstances, and leads to the ultimate discharge of that fluid in various ways to be afterwards noticed.

On the pericardium the same results follow from inflammation as on the serous membranes; but it is important to observe, that the very common rheumatic inflammation, even if rapidly fatal, is found to be there attended with a peculiarly copious exudation of fibrin, with a smaller proportion of serum than is found in those cases where no previous rheumatism has affected the patient.

On *mucous membranes* there is more variety in the effects of inflammation. On all of these, when inflamed, there is a brief diminution, very soon followed by a permanent increase of the secretion: this secretion is changed from its

natural condition, and undergoes further changes as the inflammation advances, being first more watery, but afterwards thicker than usual, and in the case of the lining membrane of the urinary passages, and in some cases where the tunica conjunctiva of the eye is affected, soon becoming decidedly purulent. A similar change is seen to be frequently, although more slowly, produced on the mucous membrane of the bronchiæ; rarely on other mucous membranes, where there is no ulceration. On some of these membranes lymph is thrown out rapidly, so as to form a continuous false membrane in the larynx and trachea in the croup of children; occasionally so as to form a similar false membrane in the intestines, but more generally so as to form numerous small irregular patches in the great intestines in dysentery: in some instances the chief mischief is done by inflammatory effusions in the submucous tissue; as in the œdema glottidis, and again in the usual mode of formation of strictures of the urethra. On the mucous membrane of the alimentary canal, inflammation has not the same tendency to spread extensively as in the air passages; and the effect chiefly to be apprehended in the former part, is the formation of numerous circumscribed ulcers, each preceded and bounded by more or less deposition of lymph, sometimes attended with sloughing. In the air passages, and in the bladder and urethra, this tendency to ulceration from simple inflammation is much less perceived; but the peculiar tendency of inflammation there, as to a certain degree in all mucous membranes, is to degenerate from the acute into the chronic form.

Sloughing or gangrene may be said to be a rare termination of simple healthy inflammation in any internal part, except the alimentary canal, from the stomach downwards. In these parts it is a common result of such inflammation, both in the serous and in the mucous membranes; and for this peculiarity of inflammation of these parts we have probably a sufficient reason in the enfeebled state of the heart's action, afterwards to be noticed, as usually attending it.

In the *parenchymatous viscera*, the natural course of inflammation is to the deposition of lymph, and then to the formation of circumscribed abscesses, as in the cellular membrane. This is most remarkably seen in the liver, but also in the pancreas, spleen, kidneys, lymphatic glands all over the body,—occasionally in the brain and in the lungs.

The usual course of inflammation in the lungs is not, indeed, to the formation of circumscribed abscesses; but the inflammatory effusion in them undergoes the same changes as in cellular membrane: first, serum is thrown out loaded with fibrin; gradually the latter ingredient predominates, and the solid, but soft greyish granular matter, characteristic of hepatisation, chokes up the cells of the affected part of the lungs, and gives it the *granitic* appearance accurately described by Laennec. But if these changes are not fatal, this effused lymph is often gradually converted into pus, constituting the third stage of pneumonia; and if this is only a partial change, the purulent matter may be expectorated, and the spongy structure of the lung probably restored.

Whether the lymph that has been effused into hepatised lung is afterwards liable to absorption, is a more difficult question: it is certain that, in some instances, a portion of lung thus condensed remains nearly stationary for life, acquiring only a gradually darker colour, from the usual black matter of the lungs.

The ultimate termination of inflammation of the lungs in sloughing or gangrene is not uncommon, but is very generally the result either of inflammation of a peculiar or specific character, or of a complication of inflammatory action with other disease, enfeebling the circulation.

It may readily be understood that, in some of the parts already mentioned, one effect of the inflammatory effusions will be to *soften* the texture. This is done to a certain degree in the early stage, when inflammation is active, by effusion of serum, as in the lungs and liver, but more remarkably in some parts in a more advanced stage, when softening seems to be a prelude to ulcerative absorption. This is seen in the lining membrane of the arteries, and still more in the mucous membrane of the bowels. In the brain, softening with some

variety of colour (the *ramollissement rouge*, or *jaune*) seems the most common effect of fatal inflammation: it often terminates in a peculiar form of gangrene, but if so partial as to admit of recovery, is found to leave the part affected in a state nearly resembling caries of the bones. It must however be remembered, that in all these parts there may be softening, especially of that kind which is nearly unattended with change of colour, which we have no reason, either from its accompaniments or effects, to ascribe to any process resembling inflammation, and regard as a mere " perversion of nutrition."

On the other hand, from another form even of healthy inflammation there follows a permanent *hardening* of the affected part. This, as may readily be supposed, is commonly the result of a more chronic inflammation, in which there is time for the gradual absorption of the serous part of the blood originally effused. We see it exemplified in many chronic cases of inflammation, even of erysipelatous inflammation, in the cellular membrane of the extremities: we see it in the serous membranes, and where the effused lymph sometimes becomes gradually bony, especially as Laennec states, when the effusion has been originally mixed with blood; in the synovial and fibrous membranes: we see it in the lungs, liver, spleen, kidneys, testes, mammæ, and brain. In all these parts this induration from inflammation sometimes approaches closely to, or graduates into, strictly organic disease, tubercles, or scirrhus: but we meet with many cases in which it may be accurately distinguished from any of these; and in some such cases its essential distinction is shown by its being distinctly liable to absorption. The symptoms resulting, however, from this effect of inflammation changing the texture of these viscera, are hardly to be distinguished from those of strictly organic diseases equally affecting their functions. In the case of the substance of the brain being much altered, whether by the effect of inflammation or by organic disease, there is very generally, sooner or later, serous effusion into the ventricles; and it is often hardly possible to judge how far the symptoms are caused by this complication. The texture, both of arteries and veins, is also remarkably liable to induration from inflammation. This is seen in the acute inflammation of the veins, affecting this substance generally; and in the more chronic form of inflammation, which so often affects the lining membrane of arteries, the first change is very generally the deposition of patches of lymph, hardening the texture, and afterwards degenerating into various forms of organic lesion, — irregular, atheromatous, and bony deposits, and ulceration.

Mucous membranes are perhaps the only texture in the body which never becomes hardened by simple inflammation.

In regard to all the textures now mentioned it is to be observed, that when the inflammation excited in any one is very intense, it is to be expected to spread into the neighbouring textures, as we see in urgent cases of pneumonia, attended with pleurisy or bronchitis, or both — in violent inflammation of the brain and its membranes, of the liver and peritoneum, even of the peritoneum and mucous membrane of the bowels. But when the inflammation is of less intensity, it will often exist long, spread far, and produce its full effect on a membrane without touching the contiguous textures, as we see in bronchitis, pleurisy, dysentery &c. even originally acute, but not very violent, — taking gradually the chronic form, and where the whole disease is strictly confined to the texture first affected.

Inflammation affecting the *fibrous membranes* which invest the bones and contribute to their nourishment, as well as that which affects the bones themselves, tends to effusion of lymph, which is gradually converted into bony matter, as we see not only in cases of fracture but in cases of nodes, of necrosis, &c. In the bones, as well as between the bones and periosteum, collections of purulent matter occasionally form; but the ulterior results of inflammation most usually seen in bones are caries and exfoliation, or necrosis, corresponding to the ulceration and sloughing, or gangrene, of soft parts. And similar results are often seen in cartilages in consequence of inflammation; the first

effect of which, in that texture, is to cause deposition of earthy matter, and assimilate it to bone, before it undergoes these farther changes. It must however be observed, that these ulterior consequences of inflammation of bones are much more frequently observed in cases which have a peculiar or specific character, than in simple or healthy inflammation.

Muscular fibres have this peculiarity in regard to inflammation, that it may be doubted whether their nutrient vessels ever yield distinct effusions, either of lymph or pus, although they may be involved in, and even softened and absorbed by, the effusions from neighbouring textures. But two remarkable effects are observed from inflammation on muscular texture, 1. That when certain membranes lying in contact with muscles are inflamed for some length of time, the muscular fibres are excited to increased action, and thereby ultimately to hypertrophy. This we see remarkably in many instances in the heart, when either of its lining membranes has been inflamed: we see it also in the bronchiæ, as a consequence of inflammation of their mucous membrane; in the bladder of urine, when its mucous membrane is inflamed; and sometimes in the intestines, when the peritoneum investing them has been the seat of chronic inflammation. But it seems equally certain that in other cases, where inflammation has probably more directly affected the muscular fibres themselves, they lose their contractile power, and appear to be lengthened, but attenuated and relaxed. This appears to be remarkably the case in some instances of inflammation affecting the muscular fibres of the heart, likewise in acute inflammation of the intestines, and in rheumatic inflammation of the voluntary muscles, probably in those cases especially where the muscular fibres have been themselves affected, and their organisation injured: but we must admit that we do not distinctly understand in what manner this peculiar result should follow inflammation.

Some of the ulterior consequences of the different processes dependent on inflammation which we have considered, may be briefly noticed as part of the history of inflammatory complaints. When extensive suppuration has taken place in the liver, the pus effused causing by its pressure adhesive inflammation, and then ulceration, may make its way, sometimes to the surface of the body — sometimes into the stomach or colon — sometimes into the cavity of the abdomen or chest — sometimes into the cells of the lungs and bronchiæ: so also pus from the sac of the pleura makes its way not unfrequently either through the pleura costalis to the surface, or through the pleura pulmonalis into the lungs and bronchiæ, causing one form of empyema and pneumo-thorax. And suppurations commencing in the cellular substance of the back make their way frequently along the course of the psoas muscle to the groin, occasionally through the pleura costalis and pulmonalis into the cells of the lungs.

Again, when ulceration takes place in the lungs, the pleura pulmonalis is occasionally eroded, and matter and air make their escape into the cavity of the chest, and immediately excite inflammation there, producing another form of empyema and pneumo-thorax. Or when the mucous membrane of the stomach, intestines, or gall bladder, has been ulcerated, perforation of all the coats sometimes ensues, and the matter effused coming in contact with the serous membrane, uniformly excites violent inflammation.

General view of the symptoms of Inflammation. The symptoms which result from inflammation of the healthy or simple characters hitherto considered, may be arranged in a general view according as they are local, distant, or general over the body.

We need not enlarge on the local symptoms of inflammation of external parts, — whether of the true skin, where the redness as well as the pain, heat, and swelling, are obvious, and where the effusions or other results of inflammation take place under the eye of the observer; — or of the cellular or other textures immediately beneath the skin, where the redness only is concealed from the eye, and where the effusions of serum and of lymph, and the gradual formation of pus, may in general be easily detected by the touch; — or of the bones, the muscles

or fasciæ, the joints or bursæ, where the peculiar form of the swelling, attended by heat and pain, and the kind of pressure, or of attempted motion, by which the pain is most distinctly excited, in general sufficiently indicate both the existence of inflammation and the texture chiefly affected. It is in the interior of the great cavities of the body that we have the greatest difficulty in detecting the seat, and sometimes even in recognising the existence, of inflammation; yet, by careful observation, in a great majority of cases not only the existence of inflammation and the organ affected, but even the texture in which the inflammation is chiefly seated, may be distinctly made out.

The symptoms on which our attention is fixed by the definition of internal inflammation given by Cullen, the concurrence of *fever with fixed pain in some internal part, and deranged function of some internal organ*, demand the most careful study. They are of themselves sufficient to guide the practice, and very frequently do guide it almost exclusively, in the early and most remediable part of those diseases, which are more under the control of remedies than any others that come under the care of the medical practitioner: but, as each disease advances, more precise information as to its seat may very generally be obtained, and is not only satisfactory to the practitioner, but often important as regulating the details of practice.

In such investigations the pain, although often the most urgent symptom, and sometimes very characteristic, is in general, with a view to diagnosis, the least important part of the combination of symptoms. It is usually acute in the inflammation of the serous membranes, but comparatively slight, or only occasionally felt when the mucous membranes (particularly in the thorax), or when the substance of the viscera, the brain, lungs, heart or great vessels, liver or kidneys, are inflamed. And the pains felt either from slight inflammation of the parietes of the chest or abdomen, or from internal diseases not inflammatory, are not only equally or more intense than those of active inflammation, but in some constitutions are attended with very considerable febrile symptoms, as we see continually in the headachs and in the neuralgic pains, internal and external, of irritable subjects.

The local symptoms which give us the most precise information are not only those which indicate *derangement of the functions* of parts, but partly also those which indicate *alteration of the sensible qualities*, or *perceptible actions*, of internal parts, as modified by inflammation and by effusions; and it is in detecting alterations of this last kind that the greatest improvements have lately been effected, particularly by the French pathologists. These have been called by some the physical signs of disease, but this restricted use of the term physical is obviously liable to objection, and has not become general. Thus inflammation of the heart, or large arteries, not only produces palpitation—strong and sometimes irregular pulsation—but alters the sounds heard in the situation of the heart, either on percussion or auscultation, or both; and in this way we can often clearly distinguish inflammation and effusion on the pericardium from that on the inner membrane lining the heart, arteries, and valves. Again, inflammations of all the different textures contained in the lungs cause hurried breathing and dyspnœa; but if the pleura is inflamed, we observe the impeded movement of that side of the chest, and soon after the dullness on percussion, the suppressed respiratory murmur, perhaps even the distended intercostal spaces and displaced heart; if the substance of the lungs, we may detect various modifications of the sound of respiration—sometimes the crepitous rale, oftener the bronchial or suppressed respiration, and bronchophony; and likewise we have often the truly characteristic peripneumonic sputa; if the bronchiæ, we have the obvious wheezing sound, and the characteristic bronchial rales, the extent of which will often reveal a sufficient cause for urgent dyspnœa.

Again, inflammation of the mucous membrane of the bowels is not only attended with occasional pain and with a loose state of the bowels, but also (at least if the great intestine is affected) with the excretion of altered mucus,

often mixed with blood, distinctly characterising its nature. A similar observation applies to the inflammation of the bronchiæ. And it has only lately been ascertained that a particular form of inflammation of the kidneys, even when unattended with pain, shows itself unequivocally by rapidly increasing albuminous impregnation of the urine, which is of low specific gravity. It may easily be understood that inflammation of the brain will cause less alteration of the sensible qualities of any part of the body than that of almost any other organ, but the alterations in the condition of the eyes, and of the iris especially, which often attend it, are nearly of this character.

Although Cullen's diagnostic mark, the "læsa partis internæ functio," is very generally applicable to internal inflammation (as we see in impatience of light from inflamed eyes, deficiency of smell from inflamed nostrils, various forms of delirium, or stupor, or spasm, from inflamed brain, in the "vox rauca" and "tussis clangosa" from inflamed larynx, dyspnœa from inflamed lungs, vomiting of ingesta from inflamed stomach, costiveness or diarrhœa from inflamed bowels, according to the membrane chiefly affected, dysuria from inflamed bladder, &c.), yet it is very important to remember, that, in the case of those organs, the whole of which are not necessarily concerned in the performance of their assigned functions, inflammation may affect a part, while the function may be still so well-performed by the rest, as to prevent any outward indication of disorder. It is thus that we may have partial inflammation of the lungs without obvious dyspnœa, especially when the whole quantity of blood requiring to be arterialised in the lungs is less than natural,—and therefore *latent* inflammation of the lungs in feeble habits. So also the liver may be partially inflamed, while a sufficiency of healthy bile is thrown off by the sound portions; indeed, it must be admitted, that both in acute and chronic cases any indications that we have of altered function of the liver are exceedingly uncertain. And thus, also, inflammations of portions of the brain may take place, while all the functions dependent on that organ appear to be well-performed by the remaining sound parts — a fact which has certainly not been allowed its due weight in some speculations on the uses of individual portions of the brain.

Next, there may be symptoms in parts distinct from, although adjoining to, those actually inflamed, clearly indicating the seat of internal inflammations. This is sufficiently illustrated by the effect of inflamed tonsils, or inflamed larynx, in making deglutition difficult; or the very characteristic effect of inflamed peritoneum, in checking the descent of the diaphragm, and making the respiration *thoracic*.

But the most numerous of the symptoms showing themselves in distant parts in consequence of internal inflammation, and often giving much assistance in characterising these inflammations, are those usually called sympathetic phenomena, and of these there are two distinct classes, the sympathetic sensations and sympathetic actions.

The first of these are the cases where, in consequence of inflammation in some internal part, pain is felt, distinctly referred to some external part — generally referable to known nervous communications of the two, and illustrated by the pains felt at the extremities of a nerve on irritation of its trunk. Of this kind are the pain of the right shoulder attending inflammation of the liver or diaphragm, pain at the point of the urethra attending inflammation of the bladder, pain at the knee attending inflammation of the hip joint, pain stretching round the thorax or abdomen attending inflammation of the spinal cord, pain down the spine or in various limbs attending inflammation of the brain.

Again, when we see vomiting attendant on inflammation of the brain, stomach, liver, bowels, uterus, or bladder, the *action* of the diaphragm and abdominal muscles is called sympathetic, and is often a guide in the diagnosis of the disease. It depends on what has been lately and reasonably termed a reflex action of the medulla oblongata and spinal cord, with which the sensation of nausea is connected, certainly as a general accompaniment, probably as a link in the chain of causation. And it is in the same manner that inflammation of the

mucous membrane of the air passages causes cough, that of the mucous membrane of the colon, or rectum, causes tenesmus, and that of the mucous membrane of the bladder causes strangury ; the actions of various and even distant muscles, in all these cases, being only an excessive degree of those sympathetic actions which are naturally linked with the healthy irritation, and with the excited sensations, of those mucous membranes, for the useful purpose of the expulsion from the body of the excretions that pass off from those mucous surfaces.

As to the general fever which coexists with these local symptoms in cases of internal inflammation, it is important to observe,

1. That although in the case of simple and healthy inflammation we are accustomed to regard the constitutional fever as the effect of the local inflammation, still cases are not wanting where the febrile attack originating, *e.g.* from cold, distinctly precedes any local symptoms, and has been thought to contribute to their production. This is most observable in some cases of cynanche tonsillaris and inflamed mamma, when the organ that becomes inflamed is so situated, that if its inflammation had really preceded the febrile attacks, it seems difficult to understand how it could have escaped notice.

2. That in the more common case, where the symptoms of the local inflammation exist in a slight degree for some time before the general fever declares itself, the first constitutional symptoms sometimes take place very gradually and insidiously; but in many cases there is a sudden and well-marked attack of rigors, which it is always very important to mark, because the sooner thereafter that the vigorous antiphlogistic measures are employed, the more confidence we may have in their efficacy.

3. That in early life, and in persons of sanguine temperament or excitable habit, the degree of febrile reaction which will attend any given extent of inflammation is much greater than in advanced life, or in persons of feeble habit or more phlegmatic temperament; and that, in the former case, the febrile symptoms may often be observed to continue for a few days, after the most urgent at least of the local symptoms have ceased, and when no further active treatment is required to cause its decline. On the other hand, a rapid and decided abatement of all the symptoms of the constitutional fever attending inflammation is always of great importance, and warrants a favourable prognosis, even although it be observed that the inflammation spreads, and the inflammatory effusions increase, for a time, after that change. This may be particularly remarked in some cases of pleurisy and pneumonia, and corresponds to what we see in cases of external inflammation.

4. That even in the same persons, the degree of febrile reaction consequent on inflammation seems to vary remarkably according to the seat of the inflammation, and is therefore by no means in uniform proportion to its extent. Inflammation of the tonsils is attended, in many persons, with a higher degree of fever, in proportion to its extent, than probably that of any other organ; and the inflammation of the serous and synovial membranes is usually attended with more fever than that of equal importance in the mucous membranes, or parenchymatous viscera.

5. That although the state of the circulation which attends simple or healthy inflammation in its early stage is that which is strictly called inflammatory fever, and which is chiefly characterised by firm and full pulse, and enduring heat of skin, not easily reduced by evacuations, yet there are some instances of remarkable modification of this febrile state. The fever which attends inflammation of the stomach and intestines is characterised in most cases by an early and often rapid depression of the heart's action, strongly resembling, and evidently illustrated by, the strongly sedative, sometimes quickly fatal, effect produced on the heart's action by violent injuries of the abdomen. An effect somewhat similar results, in many cases, from inflammation of the kidneys, uterus, bladder, and larger joints; and, in all these cases, the peculiar sensation (a combination of nausea with pain) attending the inflammation, may be rea-

sonably regarded as the medium of transmission of this peculiar sedative influence to the heart.

Again, if the system has been strongly affected by some other influence, either previously to, or simultaneously with, the excitement of inflammation, the fever attending that inflammation is often remarkably modified, and may take very much the typhoid form. This is especially observed in the case of inflammation attacking a constitution in which the nervous system has been habitually influenced by peculiar stimuli, such as alcohol taken in excess; also in the case of inflammation from an injury which gives a violent shock or concussion, and permanently enfeebles the heart's action; and in the case of inflammation attended with the introduction of peculiar animal poisons into the system, which will be afterwards more particularly noticed.

6. That where the different effects of inflammation already stated have taken place to any considerable extent in any organ, it must be expected that the symptoms of the general fever attending them will undergo a change; and this change of the general symptoms is always very important to be marked, as it generally demands a material alteration of the remedies employed. The nature of the change is different according to the organ affected: in some cases, as in acute abdominal inflammation, and also, although at a later period, in acute pneumonia or bronchitis, it is mere depression of the strength of the heart's action; in the case of inflammation in the brain, or at the heart, there is a more peculiar alteration of the heart's action. But the most striking and most general is the transition of the inflammatory fever to the form of hectic, which most generally attends the processes of suppuration and ulceration. This often begins by rigors, and is marked by evening exacerbations (sometimes two in the day), and by morning sweats with abatement, but not perfect solution, of the fever,—by a slight degree only of the thirst, anorexia, or disorder of the organic functions, usual in fevers,—by the absence, until the very last stage, of delirium, or other derangements of the nervous system,—by the long-continuance of the febrile state, and progressive emaciation and debility,—and, towards the end of most fatal cases, by diarrhœa, and a florid, often aphthous, state of the mouth and throat, often connected with ulceration of the mucous membrane of the bowels, chiefly of the ilium. These affections of the mucous membrane seem very similar to those which are so apt to attend insensibility of this surface from palsy or lesion of nerves. This state of hectic fever is much more distinctly marked in young and irritable constitutions than in others, and in such constitutions is the result of various other long-continued diseased actions besides suppuration.

It has been often stated, that a sudden sinking of the pulse, coldness of the skin, and collapse of the features, succeeding to inflammatory disease, are an effect and an indication of gangrene. But in some cases of inflammation, particularly in external parts, gangrene takes place where there is no such sinking of the circulation; and in many cases of inflammation in all parts, *e.g.* in the lungs or bronchiæ, but more particularly of abdominal inflammation, this sinking takes place and is fatal, without gangrene showing itself. Such a state of the circulation following inflammation, therefore, is to be considered as a frequent attendant, and often as part of the cause, of gangrene; but not as its effect, nor necessarily as its indication.

In some cases of inflammation the change which takes place in the febrile symptoms in the advanced stage of the disease, when the inflammatory effusions have in general made some progress, is different, *e.g.* in inflammation within the brain, the slow or irregular, and afterwards the very frequent, pulse is to be expected: in cases of inflammation of veins, the fever usually takes gradually the form of typhus. But in every case where we have any manifest alteration of the general febrile symptoms, combined with persistence of the local symptoms, whether these last indicate deranged functions, or altered sensible qualities of parts, we must regard the period as one of great importance

both as to the prognosis and the practice ; indicating generally a state of matters in which the active antiphlogistic treatment is no longer advisable.

Varieties and complications of Inflammation. This brief summary of the morbid anatomy, and of the symptoms, of inflammation would be very imperfect if it did not include some statement of the *varieties* to which the process is liable. These may be arranged in two great divisions, in the first of which the variations are in the intensity or duration only of the disease ; in the other they are in the nature of the organic changes to which it leads ; and the differences from the more usual type are in the one case only in degree, in the other in kind.

1. Of the first description is the important distinction, which has very properly attracted much attention of late years, between the distinct and the latent form of inflammation ; the latter term being applied to cases, not uncommon, where internal inflammation takes place, and produces its usual effects on the textures concerned, with so little of its usual symptoms, as not to be recognised, without very unusual care and discernment, during life.

The absence, or slight degree, of the symptoms of inflammatory fever is very generally to be ascribed, in such cases, to a want of what is usually called mobility or excitability in the constitution. This languid state of the constitution (probably both of the nervous and vascular system), is remarkably observed in the black varieties of the human race as compared with the white ; in the experience of physicians in this climate, it is much oftener dependent on age than on any other cause ; to a certain degree it may often be remarked in persons of the lower ranks as compared with those of the higher, who have been accustomed to a more luxurious mode of life.

The absence of the usual local symptoms in cases of latent inflammation may be ascribed to two distinct causes,—sometimes it depends on a state of great debility and emaciation, in which the whole quantity of blood sent to any organ is considerably less than usual, and therefore less suffering, and less obvious derangement of function than usual, results from its obstructed and disordered motion there ; thus it is, that latent inflammations, particularly in the lungs, frequently occur in convalescents from acute diseases. At other times, some of the usual local symptoms are obscured merely by the concurrence of other diseases impairing the sensibility, as in many cases of typhoid acute diseases, and again in many cases of palsy, or other chronic affections of the brain.

As it is obvious that what have lately been called the physical signs of disease, *i. e.* symptoms drawn from observation of altered sensible qualities of parts of the body (*e. g.* those furnished by percussion and auscultation), can not be obscured in these ways, a peculiar value is attached to them in suspicious cases of this kind : but it must also be observed, that as many indications of this kind may be given by chronic as well as by acute disease, much caution is required, in drawing inferences from them, as to the existence of inflammation, unless they are supported by some at least of the other symptoms usually combined with them in inflammatory cases.

The other distinction to be noticed under this head, is into the acute, subacute, and chronic forms of inflammation. The term subacute is a proper one, because there are cases of inflammation, sometimes occurring idiopathically, oftener perhaps symptomatically, either in combination with febrile or exanthematous disease, or with chronic diseases, functional or organic, which present the symptoms of inflammation, and produce more or less of the effects of inflammation within a short time, but which never attain any great extent or intensity, nor effect great alterations of structure, and can be controlled without any very active treatment. The mucous and serous membranes present many examples of this kind, easily ascertained both by the symptoms during life and by the appearances after death.

The term chronic is properly applied to those cases in which the same effects, the same or similar effusions and organic lesions, are produced as in the most intense inflammations, but much more slowly, and with much less

urgent symptoms, particularly less constitutional fever. Many cases of this kind are the sequelæ of acute or subacute inflammation, *e. g.* chronic catarrh, chronic diarrhœa or dysentery, and gleet; but there are other cases in which, although the lesions effected are decidedly those of inflammation (as distinguished from the formation of adventitious textures), yet the attack is gradual, the progress slow, the pain or other uneasy sensations when the patient is at rest, slight, and the febrile symptoms hardly perceived, until such lesions are completed as greatly embarrass the functions of the parts, and cause much weakness and emaciation of the whole body. Of this kind are some cases of chronic pleurisy, in which enormous accumulations of pus are gradually formed; some cases of cold or chronic abscess in which perfect pus is formed in the cellular membrane in various parts, with no other symptoms than such as attend the formation of chronic tumours; many cases of endocarditis, or inflammatory deposits on the internal lining membrane of the heart and arteries,—some cases of chronic pericarditis, and of chronic peritonitis; and likewise many cases of disease of the lungs, liver, kidneys, &c. where nothing but coagulable lymph is deposited in those organs, but where the whole progress of the disease is not only insidious, but very much slower than that of acute inflammation, and the characteristic mark of which, on dissection, is induration of the texture affected, contrasting remarkably with the softening, which, as formerly noticed, is usually observed in the more acute inflammations of the same textures.

II. Of cases which are properly referred to the general class of inflammations, because they are cases of pain, swelling, heat, and redness, more or less intense, followed by peculiar exudations from the vessels of the affected parts, but in which the products formed, and the whole progress and terminations usually observed, are specifically different from those of simple inflammation of the same parts, it were easy to make a long enumeration, particularly of those seen on the surface of the body; but the peculiar inflammations which are of the highest importance are the following:—

1. The *Scrofulous* inflammation in all parts of the body is produced by the same exciting causes as the healthy, but is usually of a subacute or chronic character, attacking more slowly and producing less pain, less heat or swelling, and a more livid or purple colour, in the parts affected, and less firmness of pulse and heat of skin in the febrile reaction, and less influenced by antiphlogistic treatment, whether general or local. In these respects it is hardly to be distinguished from simple chronic inflammation; but even in its earlier stages it is often farther and properly distinguished in two ways, 1. By the description of persons whom it affects; and, 2. By the parts in which it is most frequently seated. It occurs chiefly in young persons (from the age of two or three to thirty or thirty-five) of delicate habits, with a peculiar softness of skin, and an obviously feeble capillary circulation on the surface, as shown by the facility with which the extremities are chilled and the complexion rendered pale or livid by cold,—most remarkably in those whose parents or ancestors have been similarly affected,—in those who have been imperfectly nourished in early youth, and who have been subjected, at that period of life, to other permanently debilitating causes, to impure air, deficient exercise, and long-continued applications of cold and moisture,—and in those who have recently suffered from some peculiarly debilitating influence, such as mental depression, febrile disease, particularly the contagious febrile diseases, or the incautious use of strong remedies, such as mercury. In such persons it affects peculiarly the nostrils and upper lip, the eyes, the lymphatic glands in all parts, and the joints or extremities of the bones in childhood, and the lungs in more advanced life, appearing however very frequently in other parts, both external and internal.

But the essential peculiarities of scrofulous inflammation (as distinguished from healthy) show themselves in the effects to which it leads, particularly in the following results:—1. In external parts; in slow suppuration, distinguished by the formation of a thin or watery pus, containing fragments of the consistence of

soft cheese or lard. 2. In this suppuration, very frequently degenerating into languid and intractable ulceration. 3. In internal parts; in the rapid deposition of the small roundish granular bodies, to which the name of tubercles is now very generally restricted, and which are often the prelude to the unhealthy forms of suppuration and ulceration just mentioned.

It has been much disputed, indeed, whether tubercles are, in any case, a product of inflammation; and it must be allowed, 1. That they are often found to have been deposited in parts where there has been no previous indication of inflammation, or even of congestion of blood; and, 2. That even in a constitution where there are extensive tubercular deposits, inflammation may produce its usual effects, and wounds heal by granulation, of the usual appearance. From this last fact it is plain, that inflammation of a certain degree of intensity, even in a scrofulous habit, will produce effusion of coagulable and organisable lymph.

It is certain, also, that tubercular matter once deposited from the bloodvessels is never organised like the exudations of lymph; and, according to Gendrin, the decolorised globules of blood, which may be recognised in strictly inflammatory exudations, are not perceptible in them. A specific distinction therefore obviously exists between the results of healthy inflammation and tubercular deposition. But when it is remembered, that the deposition of tubercles may pretty certainly be determined by long-continued mechanical irritation;—that in cases where they are found to have been deposited rapidly, and in great numbers, and therefore have been quickly fatal, the causes exciting, and the symptoms, general and local, attending the disease, are found to have been almost precisely those of inflammation of the same parts;—when it is remembered, also, that scrofulous tubercles in their incipient stage are found not only intermixed with, but graduating by insensible degrees into, the usual inflammatory exudations;—and that, in their advanced stage, in children (where their progress is more rapid than in adults) they may often be found softening and suppurating precisely in the same manner as the lymph thrown out by inflammation,—it can hardly be doubted, that the process by which tubercles are formed in the different textures ought to be regarded, in many instances, as a form or modification of inflammation.

The fact seems to be, that when the blood is in a peculiar and unhealthy condition, the result of the remote causes of scrofula, when its vitality is deficient and probably its fibrin deficient—when its motion is languid in the small capillaries, particularly in those parts of the body where the capillary circulation is necessarily slow, as at the apex of the lung and in the lymphatic glands,—partial exudations of its albuminous portions are very apt to occur (just as extravasations of blood, of which the fibrin has been artificially abstracted, or deprived of its coagulating power, in the experiments of Magendie, are found so readily to take place);—that these albuminous exudations, not possessed of the vitality which is requisite for forming a cellular tissue, or becoming organised, cohere into minute spherical masses, as happens to any fluid of a similar consistence spread out in thin films on any surface, and thus give origin to tubercles, which afterwards grow by attracting the same materials out of the bloodvessels; and that this exudation, although not absolutely dependent on, is much promoted by, congestion of blood, or inflammation, of a low degree of intensity, in the parts where it takes place.*

All the facts connected with tubercular deposition and its connection with inflammatory effusion, seem to depend on the principle, that the fibrin of the blood is deficient in vitality, *i. e.* deficient in those properties which it possesses only during its residence within a living body; in consequence whereof it readily escapes from the small bloodvessels (in which we know that it is re-

* That a peculiarity in the vital constitution of the blood is essentially concerned in the production of tubercles, appears most distinctly from this, that tubercles may sometimes be distinctly perceived in the decolorised coagula found after death in the heart and large vessels of scrofulous subjects.

tained very much by its own vital properties), and when it has escaped assumes the forms which the gravitation of its particles, in the absence of peculiar vital attractions, determines; that, under the influence of a slight or chronic inflammation, causing congestion and relaxation of the small bloodvessels, this kind of extravasation will be peculiarly apt to occur; but that, under a stronger excitement, a more intense inflammation may be excited in which the same blood may participate, and in which its fibrin may be both augmented in quantity, and have its vital properties so heightened, as to furnish the same products as are seen in the inflammation of a healthy constitution.

Scrofulous tubercles have been likened by some to parasitic animals, and others have denied that they undergo any vital changes after they have been once deposited, supposing them to be then merely foreign particles, which are broken down and carried off by the purulent matter effused from the vessels of the living textures around them: and it is certain that they do not themselves contain bloodvessels; that the parts in which they are deposited become gradually nearly void of blood, and the vessels supplying them obstructed; and it is doubtful whether the whole of a tubercle, once deposited, is ever taken up again into the circulation. But they certainly often undergo two changes, which may be strictly called vital: in more acute cases many of them soften and break down (in like manner as the lymph effused from healthy inflammation in cases of abscess does), generally into an irregular and unequal purulent matter; but, in the case of children, often into pus of pretty healthy appearance; and in more chronic cases, when the constitution has not so much suffered, they gradually harden into inert masses, often ultimately into earthy concretions, by the absorption of their softer parts.

The growth and the unhealthy suppuration of scrofulous tubercles, as well as other cases of scrofulous inflammation and its consequences, are attended by symptoms, both local and constitutional, evidently akin to those of healthy inflammation of the same parts, but differing from them in being less violent and more chronic and intractable, the pulse usually more frequent and softer than in healthy inflammation, and the fever taking more surely the form of long-continued hectic.

2. The *Erythematic* inflammation is another well-marked modification of the process which has been described as simple or healthy inflammation. The peculiarities of this form are, 1. The tendency to spread much more rapidly and extensively along the surface in which it commences; and, 2. The much less tendency to effusion of coagulable lymph, and the total absence of the plastic quality, or power of becoming organised in the effusions. On the skin the matter effused is in general serum only, but in the subcutaneous cellular membrane, and in serous membranes (which are unquestionably liable to this form of inflammation), a fluid more or less distinctly purulent, although never bounded by deposits of concrete lymph, is often poured out in very large quantity.

This form of inflammation often occurs in the subacute degree, attended with little fever; and the term Erythema is then properly applied. But in the more violent cases there is much fever, attended with two striking peculiarities, 1. That it begins sometime before the inflammation shows itself — sometimes three days sooner; and, 2. That it may be intense and dangerous when the inflammation is slight, and has very frequently more of the *typhoid* character than that which attends the healthy inflammation of the same parts, *i. e.* the pulse is softer, or more easily reduced in strength by evacuations, the tongue is drier, and there is more evidence of deficiency of secretions, the voluntary muscles are more enfeebled, and there is more delirium or tendency to stupor. To such cases of erythematic inflammation the term Erysipelas is properly applied; and they evidently belong to the same class of diseases as the contagious exanthemata.

In such cases the erysipelatous inflammation often tends to sloughing or gangrene, particularly in the cellular substance, where it may exist indepen-

dently of any erythema on the skin, and has been described under the name of the *diffuse* inflammation. This tendency of the inflammation is obviously given by the typhoid nature of the fever attending it, and which often implies great danger, altogether independent of the extent, or of any effects, of the local inflammation.

The tendency to erythematic inflammation exists in some individuals more than others; but in many cases it is obviously given, not by internal constitution, but by some hitherto imperfectly understood external cause, which is obviously of local and temporary operation; because at certain times, and in certain districts, it prevails much more extensively than at others. The disease is certainly capable of being transmitted from one person to another by inoculation, and is certainly propagated in many cases by contagion, which is in fact, as to it, nearly the same thing as inoculation, because it is almost exclusively in those persons in whom there has been some wound or irritation of the surface, that the contagious effluvia apparently arising from others affected with the disease take effect. But in this, as in other cases of diseases which become epidemic, although we are sure of contagion (*i.e.* of intercourse with persons already affected), being one cause of the extension, we have reason to believe that it cannot be the sole cause.

The erysipelatous inflammation and accompanying fever is certainly more apt to occur in confined and ill-aired situations than in others; and its specific cause is certainly often developed in hospitals, or attaches itself peculiarly to them.

The same form of inflammation is often seen, at the same time, and in the same persons, to affect the mucous membranes of the nose, mouth, throat, and larynx, or even to spread from the face inwards to these parts, or *vice versâ.* It not only affects, as already stated, the cellular membrane frequently and extensively, but occasionally the fibrous membranes, as the pericranium. From the frequency of inflammation of the veins in connection with the diffuse inflammation of the cellular membrane, it may be presumed that their lining membrane is liable to the same form of inflammation. And there is good evidence that the peritoneum frequently, and the serous membranes of the thorax occasionally, take on inflammation presenting very nearly the same characters as erysipelas of the skin, tending to the effusion of a bloody serum, mixed with a little purulent matter, of a whitish milky fluid or of a more perfect pus, but with little or no exudation of plastic lymph; that such cases are occasionally epidemic; that they may be observed to be in connection with external erysipelas; that they are attended with great depression of the circulation, and are little under the power of depleting remedies; and that the danger of the disease, in the worst cases of the kind, is so little dependent on the extent or intensity of the inflammation, that in the cases most rapidly fatal the least amount of inflammatory exudation is found on dissection.

The most remarkable case of this kind is the Puerperal fever, which is certainly often communicated by the medical attendant of lying-in women; but a precisely similar form of peritoneal inflammation certainly exists, and even spreads epidemically in some instances, independently of parturition.

Again, the animal poison which is frequently developed in dead human bodies, before putrefaction has made any progress, excites inflammation of the same diffuse or erythematic character, and fever which is often typhoid, and so completely independent of the local inflammation as its cause, that it has been known to be fatal when no inflammation was perceptible; and is very generally most dangerous, when the inflammation at the puncture where the poison has been introduced is slight, and when the diffuse inflammation commences at a distant point, *i.e.* at the axilla in the case of a puncture in the finger.

As to all these forms of erythematic inflammation it is to be observed, that there is a great difference in individual cases; the inflammation is sometimes intense, the fever attending is high, the pulse firm, evacuations well borne, and the local effects of the inflammation, if not controlled by remedies, dangerous;

but, in other cases, the inflammation is comparatively slight, its local effects inconsiderable, and the fever attending it typhoid, and evidently aggravated by much evacuation. And in this, as in other instances of epidemic febrile diseases, these differences are seen, not only in individual cases, but in the prevailing or average character of the cases occurring in different places or at different times.

The effects excited in the human body by the poison of glanders in the horse, afford another example of the introduction of a poison exciting inflammation of a peculiar or specific character, singularly different in its progress in the human body from what is observed in the horse, inasmuch as its progress is much more rapid, and its termination in gangrene almost uniform.

3. Nearly allied to these examples of specific inflammation are the characteristic effects produced on the skin, and generally upon certain internal mucous membranes, by those animal poisons which produce the febrile and contagious exanthemata,—plague, small-pox, chicken-pox, measles, scarlatina, and likewise a large proportion, and the most characteristic examples, of the common contagious continued fever or typhus. In all these the true skin is partially inflamed, and the cuticle at the parts affected is sooner or later separated and detached, showing that there had been not only congestion of blood in the affected parts of the skin, but alteration of their usual secretion; but there is a wide difference in the appearance, progress, and effects, of this inflammation, by which these diseases are easily distinguished from one another. In all these diseases, known in this country, the mucous membrane of the fauces is more or less peculiarly inflamed: in the small-pox and measles the mucous membrane of the lungs; in scarlatina that of the nostrils, and the lymphatic glands in the neighbourhood of the tonsils, which often ulcerate and slough; and in the measles the mucous membrane of the intestines is very often also inflamed, and that of the eyes and nostrils uniformly. The inflammations of the internal membranes have not the same specific peculiarities of appearance as those of the skin. But of all these, as well as of erysipelas, it is certain that these different inflammations are not the cause of the fever which attends them, being uniformly of later date than the febrile symptoms; that they differ somewhat in character from, and run their course in a more definite time than, the healthy inflammations of the same parts; and that they constitute, in many cases, but little of the danger of the diseases in which they occur; but that, in some cases, they are more intense, approach more to healthy inflammation of the same parts, constitute a greater part of the danger, and admit of more active treatment than in others.

In all these cases it is certain that a peculiar poison circulates in the blood, generally absorbed from without—in the case of the typhus fever, probably, sometimes generated in the body itself—and the peculiar or specific agency of this poison in exciting inflammation at particular parts is so far illustrated by the known effect of mineral poisons, as arsenic or mercury, or various vegetable matters, as jalap, scammony, savine, &c. taken into the blood, in exciting inflammation on particular portions of the internal mucous membranes (and in the case of mercury and arsenic on the skin likewise),—or of various poisons, animal and vegetable, in producing urticaria or analogous eruptions. But, in the case of the strictly *morbific* poisons, two striking and peculiar phenomena are observed,—1. That, after the poison is introduced, it lies latent for a time, often a long time, before it excites either fever or inflammation; or, as it has been recently expressed, it has a period of *incubation*. 2. That, after it has produced its full effect on the system, not only the products of the inflammation at the parts affected, but other excretions from the blood, and perhaps the blood itself, have the same power as the poison originally introduced, of exciting, or of propagating, the disease in others; so that the poison has in some hitherto mysterious manner been "multiplied in the mass of blood" before producing its specific effect. Two other facts may be stated, as equally well ascertained, in regard to the process to which these morbific matters are subjected in the living body,—1. That in certain circumstances, not yet fully understood, instead

of being multiplied in the blood, and producing their effects on the body, they are probably decomposed, and certainly expelled from the body, and are innocuous; and, 2. That any living body, in which any one of these has once produced its full effect, is thereby rendered nearly insusceptible of the same changes in future, and may, in general, absorb the same poison to any extent afterwards, without suffering any multiplication of it within itself.

4. On the surface of the body, inflammation certainly occurs in a greater variety of peculiar or specific forms than in internal parts. Almost all the cutaneous diseases, the mere erythemata, the papular, the scaly, the vesicular, the pustular, and the tubercular, are the effects of inflammatory actions on the skin. The pain, heat, and redness, are in many of these of short duration, in comparison of the other appearances to which these specific inflammations lead, and by which they are recognised: but cases occur of all these forms of cutaneous disease, in which the inflammation of their first stage is well-marked and intense, and obviously moderated with great advantage to the patient by the ordinary antiphlogistic remedies.

The same general observation may be made on that peculiar or specific inflammation of the subcutaneous cellular membrane, distinguished by numerous small circumscribed collections of pus, forming within a single inflamed spot, and going on very certainly to sloughing of the interposed portions of the cellular substance, to which the term Carbuncle has been applied; and likewise on certain peculiar or specific inflammations of the mucous membrane of the mouth or fauces, seen chiefly in children, or occurring symptomatically in adults; the Aphthæ, that particular affection to which the name of Diphtherite has been given, which is occasionally epidemic, and when it extends into the larynx is very generally fatal; and that much more rapid and malignant form of inflammation, going on quickly to ulceration and wide-spreading gangrene, which has been described under the name of the Cancrum oris.

There is reason to believe that the inflammation of the mucous membrane of the great intestines which characterises dysentery, when it prevails epidemically (and pretty certainly spreads sometimes by contagion), is in like manner specific; and, because specific, is attended with more depression and danger, and is less under the influence of remedies, than simple inflammation of the same parts: and it is still doubtful, whether the inflammation and ulceration of the mucous membrane, especially of the clusters of mucous glands, of the intestines, which are so common, and have attracted so much attention of late years, (both in continued fever, especially if of long continuance, and in hectic fever), are to be regarded as specific inflammations, or how far they are the effect of the usual contents of the intestines, and especially the excretions which pass off through them, acting on a mucous membrane, which in consequence of the previous disease is nearly divested of its protecting mucus.

5. There are still three other forms of disease, properly called inflammatory, both on account of their first symptoms and of their characteristic results, but which are likewise strictly specific inflammations, viz. the Rheumatic, the Gouty, and the Syphilitic inflammation.

The first of these is distinguished by the number of textures which it affects in different or even in the same individuals, the fibrous or synovial membranes, the sheaths of the muscles, perhaps the muscles themselves, the neurilema investing the nerves, often portions of the bones (in cases of nodosity of the joints), and frequently also both the pericardium and the internal lining membrane of the heart and great arteries. It is distinguished, also, by the rapidity with which it shifts, either from one part of the body, or from one of these textures, to another; and farther, by never tending to suppuration, ulceration, or gangrene. Indeed, there are many cases of rheumatic pains, in which we must admit that the existence of inflammation is not shown by the characteristic effusions on any texture; but when we have opportunities of observing its effects on the synovial membranes, sometimes on the ligaments of the joints,—on the bones, and on the heart, in the dead body,—or when we observe the

symptoms, and the effect of remedies on acute cases of the disease in the living body, we cannot doubt of its being correctly classed with the inflammations. It seems probable that there is some peculiarity in the condition of the blood, which disposes to this form of inflammation, rather than others, on the application of cold or wet; and it is certain that, in cases of acute rheumatism, the buffy coat seen on the blood is usually remarkably thick; and that, in the rheumatic pericarditis, the effused matter is more solid than in other cases where the same membrane is inflamed. How such peculiarity may be produced is quite uncertain; it has not been distinctly traced to any peculiarity of diet or mode of life, and it is certainly not communicable from one individual to another.

We have rather more information, although by no means precise knowledge, as to the peculiarities of the Gouty inflammation, which occurs only after the age of puberty and seldom in youth, which affects only a few joints in one paroxysm, and generally the small joints in the extremities — which is always preceded by a disordered state of the stomach; and, when it recedes suddenly, is very generally followed by violent affection of the stomach, sometimes apparently a metastasis of the inflammation, often rather a gastric neuralgia. This is a form of inflammation to which only a portion of mankind are in any circumstances liable; its occurrence in them seems to depend very much on hereditary predisposition, and very much on plethora, especially if induced by the use of fermented liquors. We know that it is much connected with the gravelly deposits in the urine; and that, in severe and protracted cases, it leads not to suppuration or gangrene, but to the deposition of concretions, consisting in a great measure of lithic acid. The existence of a peculiar ingredient in the blood, determining various morbid changes and a peculiar form of inflammation, seems here sufficiently indicated.

The symptoms of Syphilis proceed always from a peculiar or specific poison, which may be introduced into the blood in various ways, and excites diseased action, always inflammatory in the first instance, with these curious peculiarities, —1. That it affects certain organs only, the skin of the genital organs peculiarly, but the skin generally, the lymphatic glands, chiefly however in the groin, the mucous membrane of the fauces, the iris of the eye, and the periosteum and bones, at the parts where these are most dense. 2. That it is every where, when uncomplicated, of chronic character, but leads to different consequences in different parts, — in the skin of the genitals very certainly to ulceration; on the skin generally to various exudations, perhaps most generally scaly, and often subsequently to ulceration; in the lymphatic glands, to suppuration, and then to ulceration; on the iris, to simple effusion of lymph; in the bones, first to increased deposition, and afterwards to irregular absorption and caries. 3. That it is often combined with, or passes into, simple acute inflammation of the same parts (especially under excitement), or scrofulous inflammation. 4. That even independently of such combination, there are many varieties in the appearance and progress of the affections, contracted by impure sexual intercourse, such as those indicated by the terms scaly, pustular, vincular, or tubercular venereal disease; but whether these varieties are to be ascribed to different specific poisons, or rather to peculiarities of constitution, is doubtful.

The inflammation exhibited by the poison of gonorrhœa, whether in the urethra or on the eye, is clearly specific, and often very acute, rapidly extending along the membrane, causing great swelling and copious purulent effusion, but no tendency to ulceration or sloughing, except when it affects the cornea.

The specific nature of the inflammation, both of syphilis and gonorrhœa, is clearly shown by the power of the inflammatory effusions to excite the same disease if applied to certain parts (the genitals, the mouth, the eyes, or any abraded surface) in other persons.

What has been said of the specific distinctions among inflammations, is perfectly illustrated by observing the varieties of inflammation in the eye — the

deviations from the most usual and simplest form there seen—in the purulent Egyptian, or gonorrhœal and contagious ophthalmia—in the rheumatic and usually remittent ophthalmia—in the obstinate strumous ophthalmia, tending to the formation of pustules, which in their commencement often exactly resemble incipient tubercles,—and in the syphilitic ophthalmia, attaching itself to the iris. Yet there is quite enough of common character in all these affections to justify our ranking them all as truly inflammatory; and all, in their incipient stage, admit of more or less relief from similar treatment.

Besides attending to these cases, where the specific inflammation is an *essential* and characteristic part of the disease, it is of great importance to attend to those forms of inflammation which are often called symptomatic, occurring *accidentally* in the course of other diseases, and modified by their presence. Of this the most remarkable is given by continued typhoid Fevers, because it is quite certain, that, besides the slight and evanescent cutaneous inflammation which very frequently attends that disease, various internal inflammations very frequently coexist with it—sometimes from the commencement and in consequence of the application of cold before the attack of the disease, often arising in the course of the disease; and that the combination of these local inflammatory affections with the general fevers forms a great part of the danger of many individual cases. The seat of these inflammations is various. Judging from the symptoms, we should suppose that a degree of inflammation of the brain or its membranes was common, and a certain amount of serous effusion, which is often ascribed to inflammation, is very often found on the surfaces of the pia mater after death; but it must be allowed that any unequivocal marks of inflammation within the cranium after death from fevers, at least in Scotland and Ireland, are very rare. In the chest and abdomen the parts most generally affected with inflammation during the course of fever are the mucous membranes and the substance of the lungs, and the serous membranes are almost uniformly exempt from it.

Of the frequent existence of inflammation of the mucous membranes in the course of fever no doubt can be entertained, from the increase and alteration of their secretions, and in the abdomen from the partial thickening, softening, and ulceration, with or without sloughing, of that membrane, which is frequently seen. There is more difficulty in distinguishing the effects of inflammation of the substance of the lungs, combined with fever, from that condensation and softening of portions of the lungs, which is a combined effect of a fluid state of the blood, and of gravitation acting on the blood in the very feeble state of the circulation before death, as well as after death (constituting the peripneumonie des agonisans of Laennec). But as condensation and softening of portions of the lungs after death from fever is not unfrequently observed in situations where no congestion could be determined by gravitation, we cannot hesitate to regard them as sometimes effects of inflammatory action; and on the same grounds we may say, that inflammation occurs occasionally during fever in the spleen and in the kidneys, hardly ever in other viscera, if we are careful to distinguish those latent inflammations which occasionally supervene immediately on the decline of fever, from the phenomena presented during the continuance of the strictly febrile or typhoid state.

The cellular membrane, especially in the neighbourhood of the parotid glands, is often the seat of inflammation from unknown causes in the last stage of fever, the tunica conjunctiva of the eyes often inflames and sometimes partially ulcerates, and the skin of the parts which sustain pressure in the course of the disease is very prone to inflammation,

But in all these cases the inflammation is undoubtedly modified during the continuance of the morbid actions peculiar to fever; and the essential difference from the healthy form of inflammation is, that the effusions of decolorised coagulable lymph and of pus hardly ever take place, the inflammation tending only to increased effusion in the mucous membranes, to thickening and softening (ramollissement pultacée), to ulceration, and to gangrene. The formation of

healthy pus in abscesses in the cellular membrane is always justly regarded as a sign (although not as a cause) of the decline of the strictly typhoid state.

That this modification of the process of inflammation should take place in the case of typhoid fever is what we might expect from what we know of the difference between the condition of the blood in that state of the body and in the simply inflammatory diseases, the phlegmasiæ of Cullen. And the same general observation applies to those cases of the contagious exanthemata—small-pox, measles, scarlatina, even erysipelas, in which the symptoms are most distinctly typhoid.

The inflammation of the bronchiæ which uniformly occurs in Hooping-cough, and likewise in Asthma, is so far modified by the presence of these spasmodic diseases, as to be less under the power of remedies than in other cases, and likewise to lead more surely in some cases to the emphysematous state of the lungs, which implies more permanent dyspnœa; and the production of which in the constricted state of the bronchiæ, during the fits of coughing in these diseases, is easily understood.

Again, inflammation often takes place from accidental causes in the course of chronic diseases, implying a very feeble state of the capillary circulation, particularly in Dropsy and in Palsy, and is often so modified as to have the peculiar tendency, already noticed, to gangrene.

In the course of strictly Scrofulous diseases, "intercurrent" inflammation is very common; sometimes probably causing fresh deposition of tubercular matter, in all cases so modified by the previously existing disease as to be peculiarly obstinate.

Inflammation occurs also in combination with that peculiar state of the blood seen in Scurvy and in Purpura, and its results are modified by that condition. In some cases of purpura, inflammation has been observed to have its usual characters and even blood drawn from the arm to show the usual inflammatory appearances; but in other cases, of both diseases, inflammation appears obviously to tend to hæmorrhages rather than to the usual and characteristic exudations.

This observation may, indeed, be extended to various other chronic and constitutional diseases, such as the various forms of the encephaloid disease and the melanosis, as well as to scrofulous diseases; in which a disease apparently local in the first instance so contaminates the blood, that any other local inflammation that may be excited will tend to the deposition of matter of the peculiar character already existing in the body; and thus inflammatory attacks become the means of extending such malignant diseases over the body.

"The following case," says Dr. Carswell, "is by no means rare; an individual has a tumour on the surface of the body, presenting the characters of one or more varieties of sarcoma, or cephaloma. He has an attack of pneumonia or pleurisy, or both, of which he dies in the course of a few days. On examining the diseased lung or pleura we find, instead of an effusion of serosity, coagulable lymph, or pus, that the lung is converted into a solid mass, resembling a section of fresh pork; it is in a state of scirrhus, and the pleura is studded with tumours composed of a similar kind of substance." (*Illustrations of the Elementary Forms of Disease.*)

Modes of fatal termination of Inflammation. Before proceeding to the treatment of inflammation, it is of great importance to lay down as precise principles as possible in regard to the different modes in which inflammation, in different parts of the body, may become dangerous or fatal. These modes of fatal termination of inflammatory diseases ought to be clearly and steadily in the view of the practitioner who treats them. Our knowledge of physiology enables us perfectly to understand how these are brought about, notwithstanding the imperfect state of our knowledge as to the process of inflammation itself.

1. In certain cases, all that is necessary in order that inflammation may be fatal, is merely that it shall subsist a very few days, in an intense form, on certain parts of the body, producing there only its usual effusions, in no such quantity

as materially to alter any texture, or mechanically impede any of the functions of life; the constitutional fever which it excites is nevertheless attended with such extreme depression of the circulation, as to terminate quickly in death by syncope. This is most remarkably seen in many cases of inflammation of the peritoneum; when the fatal event is preceded only by gradually increasing faintness, sickness, and vomiting, coldness of the extremities, cold sweats, and failing pulse, the breathing remaining unembarrassed, and the head perfectly clear, up to the moment of death, which can be ascribed only to sympathetic affection of the heart. But why the fatal depression of the heart's action should take place in some cases (as in the violent inflammation immediately succeeding a perforation) within a few hours from the commencement of the disease, and when hardly a vestige of inflammatory exudation has taken place, and in other cases not until many pounds of lymph or pus have been effused, we have no means of judging. The majority of cases of fatal peritonitis are unattended with gangrene. The effect of the inflammation of this texture on the actions of the heart is clearly analogous to, and illustrated by, the sudden effect of a violent injury of the stomach or abdomen, causing extreme faintness or sudden death; and we ought probably to regard the very peculiar sickening pain existing in both cases as the cause, not the effect, of failure of the heart's action.

Inflammation of the mucous membrane of the intestines, attended with diarrhœa or dysentery, is sometimes fatal in the first stage, when it has produced no other effect on the membrane than effusion of whitish lymph; this is especially so when it attacks a very debilitated subject, or when its extent on the membrane is greater than usual; and in such cases death takes place in the same manner as has been now described. And in those cases of inflammatory diarrhœa or dysentery which run a longer course and produce ulceration of the bowels, more or less of this peculiarly sedative effect on the circulation attends the disease and constitutes great part of its danger; and it has been, in part at least, owing to this cause that dysentery was ranked by the older pathologists among putrid, rather than inflammatory diseases.

The fatal effect of inflammations of other parts in the abdomen and pelvis, of the liver, spleen or pancreas, kidneys, bladder or uterus, and likewise of the larger joints, is often to be ascribed to the same principle, although the symptoms preceding it may be more complex, and more decided disorganisation may appear on dissection. For that disorganisation is often not such as materially to impair any functions essential to life in the affected organs; the extent of the disorganisation bears no fixed proportion to the depression of the vital powers attending it; and death often takes place before any exhausting process of suppuration or ulceration has been established.

2. In many cases, inflammation within the cranium (producing generally, in the first instance, not only pain, sickness, and delirium, but after a time slow or irregular pulse, spasms, or palsy) leads, even within a few days, to such consequences as we consider adequate to explain death in the way of coma, *i. e.* death preceded by stupor of some continuance, the heart's actions continuing vigorous almost to the last, but the respiration becoming imperfect as the insensibility increases, and ultimately, in the best marked cases of the kind, coming to a stand while the pulse is still distinct. We consider this kind of death sufficiently explained if we find any considerable portion of the brain or cerebellum either disorganised or compressed by effused fluids, because we know, that although the parts essentially concerned in respiration, and probably in sensation generally, do not extend higher than the medulla oblongata, yet, both in experiments on animals and in observations on the human body, it is very generally found that disorganisation or compression, though situated considerably above that part, greatly deranges or altogether destroys all vestiges and effects of sensation in the body; and this the more certainly and effectually as they are more suddenly produced, and as they are so situated as to produce pressure downwards on the medulla.

Such disorganisation or compression may be readily produced by inflam-

mation, either by softening of portions of the brain, or by the formation of circumscribed abscesses, or generally, in more chronic cases, by hardening, by effused lymph, or by effusion of pus on the membranes, or by effusion of serum on the surface or into the ventricles of the brain, — which last is indeed a very general accompaniment of any fatal inflammatory action within the cranium, and often appears as the only cause to which the fatal coma is to be ascribed.

We know, indeed, that great serous effusions may take place gradually within the head, which are neither preceded by inflammation nor followed by coma; and we are not justified, probably, in any case in regarding it either as the effect of the one or the cause of the other, merely from the appearances on dissection. But if (as often happens) we have the same set of symptoms — those of the acute hydrocephalus, more or less rapidly succeeding one another — as we meet with in cases where not only serum, but pus and lymph are found on dissection, — if we find, after these, serum only to have been effused, but in such quantity as, if rapidly effused, must have caused much pressure on the brain,—and if we know that the symptoms have been of short duration only, we cannot hesitate to regard that serous effusion also as a result of inflammatory action.

The symptoms in such cases vary considerably, but may be said in general to be, in the first instance, those of inflammation within the cranium, according to the statement already made of the general symptoms of internal inflammations; but which are masked and obscured in the later stages of the disease, by the stupor, with or without palsy or spasms, which are to be expected when the brain has been injured or compressed.

There are a few cases of inflammation of the kidneys, generally of chronic character, which terminate in such disorganisation as materially alters the composition of the urine, very greatly diminishes the amount of the excretion, and thus produces, and satisfactorily explains, gradually increasing insensibility and death by coma, analogous to that which takes place in the ischuria renalis; and we can have no doubt that many cases of hepatitis would be fatal in the same manner, were it not that the inflammation there is almost always partial, and leaves portions of the liver fit for their natural function.

3. There are many cases of inflammation in which the symptoms before death, and the appearances after it, clearly indicate and explain death by asphyxia, *i. e.* from the access of air to the blood at the lungs being in some way or other materially impeded. The most rapidly fatal cases of this kind are those in which the larynx is inflamed, leading either to effusion of lymph on the surface of its inner membrane (the preternatural membrane of croup), or to effusion of serum or pus behind that membrane, or mere thickening of the membrane, just at the rima glottidis; — or where the cellular membrane surrounding the pharynx is so distended, by effusion of pus into it, as to compress and nearly close the glottis. In such cases the fatal termination is by strangulation rather than suffocation, and is indicated by the sonorous, long-continued, and difficult inspirations, with loss of voice, croupy cough, and often difficult deglutition increasing the cough and dyspnœa; and the whole symptoms are generally remarkably liable to spasmodic exacerbations.

Another case in which death takes place by asphyxia, rather in the way of suffocation than of strangulation, and sometimes very rapidly, is that of bronchitis or pulmonary catarrh, or peripneumonia notha, *i. e.* of inflammation, thickening and rapid increase of the mucous secretion of the lining membrane of the bronchiæ. This assumes the form of the catarrh suffocant, and is rapidly fatal, sometimes even in strong habits, when it occurs more generally than usual, extending to both lungs, and in all their lobes, to the minute branches of the bronchiæ; or more generally, when it takes place in a constitution previously much enfeebled, in which probably the inflammation is more apt to spread extensively over the bronchiæ than in others, and in which the expectoration necessary for the relief of the patient is not easily established. Thus the acute bronchitis, occurring idiopathically, is often fatal in very young and very old

persons; and it is still more frequently the immediate cause of death when it occurs sympathetically, in the course of continued fevers, small-pox, measles, or hooping-cough. In its chronic form the bronchitis is often complicated with, and increases the danger of, a much greater variety of diseases.

In this last disease, as well as in many idiopathic cases, the bronchitis is attended with a peculiar spasmodic cough, or exacerbations of spasmodic dyspnœa, which however do not increase the danger so much in this disease as when the larynx is affected.

That dyspnœa threatening a fatal event depends on bronchitis more than on other inflammations within the chest, may in general be easily enough ascertained by observing the absence of dulness on percussion, the generality of the bronchial rales (especially the mucous and subcrepitous), the wheezing sound of respiration, and the character of the expectoration. In many such cases the habitual spasmodic or asthmatic paroxysm, and the indications of the emphysema of the lungs, which is a frequent consequence of them, materially assist the diagnosis: but it is to be observed that the existence of habitual bronchitis and asthma does not by any means preclude the possibility of other inflammations within the chest.

When the substance of the lungs is inflamed on both sides, the disease may be fatal before its effects have gone farther than the general effusion of serum into the bronchiæ and cells; but this is a very rare case. The true peripneumonia of one lung generally shows itself not only by fever, cough, dyspnœa, and more or less of pain; but by some physical symptoms confined to that side, and contrasting with the other; a degree of dulness on percussion, the crepitous rale, and afterwards the bronchial or suppressed respiration; but these indications are often much less distinct than those which attend the inflammation of the pleura, and of course can become distinct only when injury has been already done to the substance of the lungs. The "peripneumonic sputa," consisting of viscid translucent mucus stained with the colouring matter of the blood, either of a reddish or brownish colour, or of a yellowish or greenish (which had given rise to the idea of a "bilious pneumonia," are a very characteristic mark when present; but may be absent throughout in cases which are perfectly well-marked, and when present, afford no evidence, either by their amount or duration, of the extent or intensity of the inflammation that exists.

Acute inflammation affecting the substance of the lung may go on in three days, and, if unchecked by remedies, does often go on in less than seven, to the peculiar condensation, partly consisting of decolorised lymph, called hepatisation; and if this change is rapidly effected, it may be a sufficient cause of death by dyspnœa, notwithstanding that, in many cases of slower progress (chronic pneumonia, chronic pleurisy or phthisis), a whole lung, or even the greater part of both lungs, may be rendered impervious to air without urgent dyspnœa, or death by asphyxia. But in cases of this last kind, not only is the whole quantity of blood in the body requiring to be arterialised at the lungs gradually very much diminished, but the distribution of the blood in the lungs is gradually accommodated to the new state of things; the vessels of the diseased part are choked up and deserted by the blood, and those of the sound parts are filled and dilated, as is clearly shown by injections after death; and it is partly because these changes cannot be rapidly effected, and partly also because a partial pneumonia is often attended by a more general bronchitis, that the respiration is so much, and often fatally, embarrassed by the inflammatory condensation of a part only of one lung.

Acute pleurisy clearly indicates itself in general within a day or two from its beginning, not only by the fever and sharp pain of the side, but more unequivocally by the dull sound on percussion, the suppressed sound of respiration, and the imperfect movement of that side of the chest. But the cases of pleurisy which are uncombined with peripneumonia are seldom the cause of death by rapidly increasing dyspnœa. When the inflammation has not been of such intensity as to extend inwards into the substance of the lungs, its progress is ge-

nerally slow, and although it may lead to very extensive effusion, and completely destroy the function of one lung, it is seldom fatal while the other lung remains free from disease; and experience shows that a very great amount of such pleuritic effusion may be gradually absorbed, and leave the lung confined and often diminished by the preternatural membrane, which is permanently left, but in some degree fit for its function.

Inflammation of the heart or pericardium, if rapidly fatal, is so more frequently in the way of asphyxia than of syncope; for the obstacle opposed, whether by effusion in the pericardium, or by inflammatory exudation of unusual extent on its inner membrane on the left side (always the side chiefly affected), to the flow of blood through the lungs, causes very generally much dyspnœa, and often induces either pneumonia, extensive bronchitis, or serous effusion in the lungs.

4. In some cases, inflammation is fatal in a manner perfectly different from these, viz. by a part of the effusions which it produces being taken into the circulation and acting as a poison, producing typhoid symptoms, and often inflammation and effusions of peculiar character in distant parts. It seems pretty certain that a part at least of this effect of an animal poison, such as that communicated from dead bodies, must be ascribed to the peculiar inflammation excited at the point where it is introduced, and to a morbid matter being formed there and then absorbed, and often exciting inflammation at different points on its way into the larger veins and the general circulation. When circulating in the blood, it is certain, as already stated, that the poison excites a peculiar typhoid fever, in which the heart's action is rapidly depressed, which bears no fixed proportion to the extent or intensity of the inflammation attending it, and by which death may be effected without visible injury of any vital organs.

Another case referrible to the same head is that of inflammation of a vein, attended by the formation of inflammatory effusions, which are necessarily mixed with the circulating fluid; and in which the fever soon takes the typhoid form, often attended with vomiting and diarrhœa, always with a peculiarly depressed state of the circulation, and a peculiar derangement of the nervous system, and is in like manner often fatal without visible lesion of any vital organs. This kind of termination is always to be apprehended where a vein is inflamed, but certainly does not always take place; and the reason of its not taking place in some cases (as in some of those inflammations of the femoral and iliac veins which lead to the phlegmasia dolens) may probably be, that the only effusion from the inner surface of the inflamed vein in these cases may be of the nature of organisable lymph, not purulent, and therefore not poisonous, although mixed with the blood. And it may be strongly suspected that the more rapidly fatal cases of inflammation of the veins are instances of erythematic and often contagious inflammation tending to purulent effusion only; some of them certainly producing no fibrinous incrustation on the inside of the vein affected.

We know, from the experiments of Magendie and Gaspard, that pus injected into the veins of a living animal produces typhoid fever and death, unless a critical evacuation takes place, by which, after undergoing changes in the course of the circulation, it is probably expelled from the body; and therefore we cannot be surprised to find that similar results follow from pus being formed in a situation in the living body in which it is inevitably mixed with the circulating blood.

But we know farther, that the purulent matter of inflamed veins circulating in the blood often produces another effect, viz. local and peculiar inflammation, and rapid deposition of purulent matter in distant parts,—in the liver, lungs, cavities of joints, &c. (See particularly Arnott, in *Med. Chir. Trans.*, vol. xviii.)

From this last fact, and from the microscopical observations formerly quoted, which show that much purulent matter is found in the vessels of a suppurating part, without being effused there, we have a satisfactory explanation of the occurrence, which is certainly frequent, of rapid depositions of pus (sometimes of

tubercular matter) taking place in internal parts, soon after the amputation of limbs where extensive suppuration, or scrofulous disease, had been going on; and this especially when the wound has healed by the first intention. The suppurating surface would appear to have been the outlet, by which pus, formed at the diseased part, and taken back into the circulation, had previously found egress from the body; and when this is closed, the effect is the same as if pus had been formed within the organs of circulation themselves and produced its usual poisonous effect, both on the system at large, and also on individual organs.* If the recent observations of Mr. Gulliver and others, on the existence of globules of pus in the blood, even in the early stages of inflammatory diseases, shall be confirmed, they will give additional certainty and precision to this doctrine in pathology.

5. In many cases, the fatal effect of inflammation cannot be ascribed to the effect of the local disease, either in obstructing the function of any organ directly necessary to life, or in contaminating the blood, but is effected by gradual exhaustion of the system during suppuration and ulceration or sloughing, by which a long-continued febrile state is kept up. There are often very debilitating discharges by sweating or diarrhœa, and the functions of digestion and nutrition are so much deranged, that the patient sinks emaciated and enfeebled, in a manner illustrated by death from starvation rather than by any other kind of violent death. The death from inflammation going rapidly to gangrene is often much more quickly produced, but, according to what was already stated, is hardly ever to be regarded as merely the effect of the inflammation.

The death by gradual exhaustion is that chiefly to be apprehended in cases of inflammation of the surface of the body and of the extremities, uncomplicated either with the immediate effects of violent injuries or with other disease; and the danger attending chronic inflammation, or that which has gone on to extensive suppuration in many internal parts in the chest and abdomen, is of the same slow gradual kind.

6. The danger of inflammatory disease is often more indirect, depending on its either blending itself with, or gradually passing into, other kinds of diseased action. In the more strictly febrile and exanthematous diseases, as already mentioned, inflammation occurs almost uniformly — as part of the specific character of each disease, on the skin, and on certain portions of mucous membranes; very often as an accidental complication; sometimes probably as an effect of the disease, in different parts already noticed; and, although very generally of peculiar character, and never to be regarded as the sole danger, is very often concerned, more or less, in the fatal event. It is chiefly in consequence of such complication that the mode of death in these diseases is remarkably various, sometimes approaching closely to that by coma, sometimes by asphyxia, &c. There is a similar frequent complication of inflammation with all kinds of chronic and particularly organic diseases. Some of these diseases are merely the sequelæ of acute healthy inflammation; others (as the most common organic changes of structure in the liver and kidneys, the cirrhosis of Laennec, and the granular disease of Bright), appear to originate in more chronic inflammation and gradual degeneration or perversion of the organised matter thence resulting, and are liable to aggravation or increase from any fresh inflammatory attacks; bearing, in fact, very nearly the same relation to inflammation that tubercular deposition does; and even when no such connection can be traced between organic disease and inflammation, there is no difficulty in understanding that the combination of the two may be fatal, when either affection, existing separately, might have either subsided entirely or been comparatively innocent. This is continually illustrated when we see internal inflammation (although of distant parts) supervening on organic disease of the

* The occurrence of jaundice without obvious disease of the liver, in many cases in which purulent matter may be supposed to be mixed with the circulating blood, is another indication of the hitherto unexplored changes produced in such cases on the constitution of the blood.

heart, lungs, liver, or kidneys, and very often quickly inducing the farther complication of dropsical effusions. For although these are specifically distinct from the extravasations which proceed directly from inflammation, yet it is quite certain that in some constitutions, especially those in which some organic disease and consequent impediment, either to the flow of the venous blood, or to the natural excretions, exist, attacks of inflammation, even of single organs, as the lungs or bronchiæ, the liver, the kidneys, are very often the immediate cause of general dropsy; and that, soon after dropsy has made some progress, the symptoms of such inflammation often coexist with it, and the remedies for inflammation may still be effectual, not only in relieving these symptoms, but in arresting the dropsical effusions, and promoting their reabsorption.

Outline of the treatment of Inflammation, particularly in internal parts. We shall conclude this outline of the subject of inflammation by a general sketch of the most approved method of treatment; stating first the essential parts of the antiphlogistic treatment, by which inflammation, if early opposed, may in many cases be effectually subdued, and in all cases moderated or restrained; and afterwards the limitations and modifications of this kind of treatment, which are demanded by various contingencies in the course of inflammatory diseases.

We speak first of the antiphlogistic treatment proper to be adopted, to a greater or less extent, in the early stage of all cases of simple or healthy inflammation, occurring in a sound constitution, and attended with more or less of constitutional fever. This kind of treatment consists of two parts, the antiphlogistic regimen and remedies.

The object of the antiphlogistic regimen is simply to remove every excitement or irritation which may augment either the strength or frequency of the heart's action, or promote the flow of blood towards the affected part; it being perfectly ascertained by experience, and indeed easily understood, whatever doubts we may entertain as to the rationale of inflammation, that when that state exists in a constitution otherwise healthy, it is aggravated by whatever promotes and accelerates the flow of blood to the affected part.

Hence the strict antiphlogistic regimen consists essentially of three parts, *low diet, rest*, and *quietude.* The abstraction, in the most urgent cases, of all solid aliments, in all cases, of animal food, and the denial of all fermented or spirituous liquors, imply a gradual diminution of the quantity of the blood, and the removal of stimuli, by which the heart's actions are obviously and strongly excited. The cessation of all vigorous or sustained muscular movement likewise removes a cause by which the circulation is obviously and often powerfully excited *; and the exclusion of all sudden and strong impressions on the organs of sense, secures the body against a set of irritating causes, which act primarily on the nervous system, but always more or less excite the vascular system likewise, and very frequently, by preventing sleep, manifestly aggravate the fever which is consequent on inflammation.

With the same general intention, various more particular precautions are of importance in the inflammation of individual organs;—in all cases, the removal of any exciting cause of inflammation which can be detected,—the horizontal position and absolute rest of an inflamed limb to retard the afflux of blood to, and favour the reflux from, the part affected,—the erect posture, when the head or any part of it is inflamed; the prohibition of all efforts of voice when the lungs or other organs of respiration are inflamed; the contact of soft substances only with inflamed portions of the surface; the injunction of darkness

* The effect of muscular exertion on the heart's action does not seem to be satisfactorily explained by the mere acceleration of the flow towards the heart by the veins; and the idea recently stated by Müller, that the contractions of the heart, although not excitable directly by the will, are liable to affection by those changes in the nervous system which attend efforts of volition acting on those voluntary muscles which have their nerves from the same branches as the heart, (as is undoubtedly the case in regard to the iris, not moveable by the will, but moving in concert with the recti muscles of the eye when strongly excited through the third pair), is probably correct.

and silence in inflammations of the eye and ear, &c. Under these precautions, the body in general, and the affected parts in particular, are placed in circumstances the most favourable to the gradual and spontaneous decline of inflammation.

Of the antiphlogistic remedies, which next demand consideration in all cases of inflammation, the only one on which absolute reliance can be placed is Bloodletting, and there is no other remedy for any other kind of diseased action which can be put in competition with this in efficacy or importance.

The efficacy of bloodletting in lessening the extent and intensity, and often arresting the progress of inflammation, would appear to depend on two principles, which it is important to consider separately, to which indeed the powers of all other antiphlogistic remedies may be ascribed,—*first*, that it weakens the heart's action; and *secondly*, that it causes a derivation of blood from the affected parts. In both ways it diminishes the quantity of living matter in which the peculiar changes comprised under the term inflammation are going on; and whatever be the precise nature of these changes, as it is certain that the blood is an agent essentially concerned in them, it is easy to understand that the greater the quantity of blood sent to the affected parts in a given time, the greater amount of these changes, and particularly the greater quantity of effusion from the vessels (with which we have seen that the danger of most inflammatory diseases is very much connected) will take place.

1. That the heart's action should be weakened by the abstraction of the stimulus, by which its motion is habitually excited and maintained, is quite in conformity with all that we see of the effect of loss of blood in the healthy state, and with the general doctrine of irritability as laid down by Haller. It is not necessary in every case of inflammatory disease, nor even in every case of such disease where the heart's action is morbidly excited, to resort to this remedy; because there are many such cases where the history of the disease which exists is well known, and no danger is to be apprehended from allowing the inflammation to run its course, under the proper regimen, and spontaneously decline; and there are many others, which are complex cases, and where the local inflammation is not to be regarded as the chief danger. But in all those cases where not only the heart's action is increased, the pulse morbidly frequent, or strong, or both; but where we are satisfied that this increased action is connected with, or maintains and aggravates, a local inflammation, which, in some of the modes already considered, threatens the life of the patient, such bloodletting as may impair the power of the heart is the appropriate and effectual remedy; and in all cases occurring in patients beyond the age of three or four (below which age leeches are to be regarded as a general evacuation), the simple and effectual mode of bloodletting is by venesection.

It is perfectly ascertained, however, that the effect of this remedy on the heart's action is by no means exclusively produced in the way above stated, by withdrawing a part of the stimulus of blood, habitually acting on the heart. The difference, daily observed, of the effect of bloodletting in the erect and the horizontal posture, clearly shows that the loss of blood may powerfully affect the heart through the intervention of the central portions of the nervous system, probably of the medulla oblongata especially, although in common language, we speak of this effect being produced through the brain. The proof of this is, that when blood is drawn in the erect posture, so that the influence of gravitation cooperates with that of the operation in weakening the flow of blood to the head, not only are the sensations and consciousness of the patient, *i.e.* the functions of the brain and medulla oblongata, much sooner affected, but the heart's own action is much sooner impaired, than when the same quantity is taken from a patient lying horizontally. A most remarkable diminution of the frequency of the pulsations is thus very frequently effected, the pulse falling, for example, from 120 to 60 in a minute, at the same time that faintness and transient insensibility are produced. This plainly implies that the sudden diminution of the pressure of the circulating blood on the brain and medulla

oblongata has acted or reacted on the heart,—in a way perfectly illustrated by many other facts; by the failure of the heart's action, often seen to have been produced by taking off the pressure of depressed bone, or effused blood, or effused serum (as in tapping hydrocephalic children), to which the brain had previously been accustomed;—by drawing off the serum of ascites, and so diminishing the pressure on the branches of the abdominal aorta, promoting the flow there, and proportionally lessening that towards the head,—or more simply by merely assuming the erect posture suddenly after long stooping. The decided impression made on the heart's action in all these cases by sudden diminution of the pressure of the blood on the brain and medulla oblongata, is in fact very analogous to that produced by a sudden concussion, in cases of injury, or sudden increase of the pressure on these parts, in experiments on animals.

This sudden and peculiar effect of bloodletting on the heart's action being produced through the intervention of the nervous system, is of course liable to modification from the condition of that part of the living body; and it is a just and important observation of Dr. Marshall Hall, that the effect of bloodletting in the erect posture may be used as a test of the cases in which the full use of the remedy is likely to be important; because, in many diseases, not strictly or solely inflammatory, but apparently demanding loss of blood, *e.g.* in many neuralgic cases, and more remarkably in the beginning of continued fever, when large bloodletting is likely to be injurious, faintness is very easily produced in this way; whereas, in strictly inflammatory cases, really requiring much loss of blood, a large quantity may usually be taken in the erect posture without faintness. It is not, however, to be inferred from this, that blood should always be taken in the erect posture. The effect of the impression communicated to the heart through the nervous system is certainly not so permanent as that which is produced simply by the abstraction of the vital stimulus; and some persons, even under strictly inflammatory disease, become faint from the loss of blood in the erect posture, before as much is taken as can produce a permanent effect on their disease; and it may therefore often be advisable, when the existence of inflammation of healthy character is clearly ascertained, to bleed with precaution, rather to retard or prevent, than encourage, the approach of fainting.

2. The effect of bloodletting in causing *derivation* from parts actually inflamed to other parts of the body has not been studied with so much care as might have been expected from the pains bestowed on it by Haller. Whether this effect is, as he thought he had ascertained, inexplicable on merely mechanical principles, or whether, as Magendie and Poiseuille assert, it is merely the effect of the contractile power of the vessels, and the forced state of distension in which they exist during life, causing a flow to any point where an opening is made, it is quite certain that a movement in that direction is immediately perceived in all the small vessels which can be brought under the field of the microscope, on a puncture being made in any one of them; and, in Haller's observations it distinctly appeared that this movement often inverted the natural course of the circulation, and often extended to portions of blood which were stagnating in vessels, and caused globules to separate and become distinct which had previously combined into irregular masses. This being so, it cannot be doubted that similar changes must be effected, in a greater or less degree, in the blood stagnating in inflamed parts, when an exit is given to the blood from other parts of the circulating system, whether by general or local bloodletting. And it does not seem possible to understand on what other principle than this, bloodletting can be useful, as it undoubtedly is in certain cases of inflammation, chiefly abdominal, when the pulse is smaller and even feebler than natural, but becomes fuller and stronger; or in others (chiefly of the head, sometimes of the abdomen likewise) when it is slower than natural, small and sharp, and becomes more frequent and fuller, after the evacuation.

It may be supposed that the chief effect of local bloodletting is in general of this last kind, and that the chief effect of general bloodletting is on the heart's

action; and it is certain that local bloodletting, by cupping or leeches, is often effectual in those inflammations, generally of subacute character, which are unattended with disturbance of the general circulation; and that it is in cases of well-marked local inflammation, attended and supported by general fever, that the power of general bloodletting is most distinctly seen. In such cases, however, the local remedy is very generally found, after the force of the inflammatory fever has been somewhat broken, a most useful auxiliary to the other.

No proposition in medical science is more certain than, and hardly any one is so practically important, as that which regards the power of large and repeated bloodletting to arrest the progress of inflammation in its early stage, before any great amount of effusion has taken place,—and to cause many cases of it to terminate favourably by resolution, with such slight effusion only as is afterwards easily absorbed; which would otherwise have gone on to extensive and probably fatal disorganisation of the different kinds above mentioned. Indeed, it has been stated, and probably with truth, in relation to healthy inflammation occurring in a sound constitution, and unattended with mechanical injury to the parts concerned, that "every constitution which is capable of having such inflammation excited in it, is capable also of bearing the evacuations, chiefly of blood, by which that inflammation may be subdued." *

When so much confidence is expressed in the efficacy of this remedy, two objections naturally present themselves:—1. How does it happen that some practitioners and teachers of medicine express themselves so doubtfully as to its usefulness, even in diseases distinctly inflammatory, and place more confidence in remedies which are here stated as of very subordinate importance? 2. If so effectual a remedy for inflammation exists, how does it happen that so great a portion of the mortality in all parts of the world depends on inflammatory diseases? To the first objection, the proper answer is, that many medical men of high and deserved eminence have few opportunities of witnessing and estimating the effects of the remedy in the early stage of violent inflammatory diseases. A physician whose practice lies chiefly among the higher ranks of society in a great town,—a consulting physician, who is called in by judicious and well-informed general practitioners, only in cases of unusual difficulty, and generally of some standing,—an hospital physician, who sees the diseases of the poor only in that advanced stage where they are willing to leave home (particularly if there are well-conducted dispensaries in the neighbourhood)—has few opportunities of judging of the power of bloodletting over the symptoms of inflammation, general and local, if employed within forty-eight hours after a sudden and violent attack in a healthy constitution. It has often happened to the writer, to meet with more opportunities of observing, and pointing out to pupils, the power of bloodletting over inflammatory disease in a single forenoon of visitation of dispensary patients, than in a three months' course of clinical instruction in an hospital. There, although inflammatory diseases are often seen, they are very frequently in those circumstances, either as to the stage of their progress, or as to complication, in which, if recovery can take place, it must be chiefly the work of nature, and often incomplete. To the second objection, what has now been stated as to the period of inflammatory disease at which patients come under treatment, is of itself almost a sufficient answer; but a farther and still more satisfactory answer is to be found in what has been already stated as to the frequent deflection of inflammatory disease from the simple and healthy type, on which bloodletting exerts its most beneficial effect, and on its frequent complication with other diseased states, either immediately preceding it or accompanying it, and altering and augmenting the danger to be expected from it.

The abatement of all the most urgent symptoms of inflammation produced by bloodletting is often very striking. The relief to dyspnœa and to palpitation, if

* Bateman.

either of these forms part of the symptoms of the disease, is in general the most immediate, and is that which it is most important to observe at the very time of the operation; because if not effected then, it is hardly to be expected afterwards. The relief to pain, especially in the head, is likewise often very rapid, but in other cases taking place more gradually, and is nevertheless equally complete within a few hours after the operation: many other uneasy feelings — heat, restlessness, thirst, anxiety, are often speedily relieved. But the advantage which is chiefly looked for, and regarded as the most decisive and the best security for all others, is that which is effected on the state of the pulse; and the change which is chiefly to be hoped for in it is, that it should become softer or more compressible. If it at the same time becomes less frequent, the advantage is more decided, but there are many cases, particularly in feeble subjects, where bloodletting is used with good effect, although the pulse, for a time, becomes more frequent, and at the same time softer, after the operation.

One effect of bloodletting in inflammatory diseases is well ascertained, so far as understood, and practically very important, viz. that by causing, according to the common expression, relaxation of the extreme vessels, by lessening that morbid impetus of the blood by which, during the state of inflammatory fever, the natural excretions are apparently impeded, and at the same time, by promoting absorption into the blood, it favours the effect of all other evacuating remedies, intended to act on the excretions of individual parts of the system. Hence it was judiciously laid down by Hoffmann as a general truism regarding this remedy "Post venesectionem sæpe excretiones salutares sanguinis, imo alvi, sudoris, urinæ vacuationes, meliùs et liberiùs quam ante eam succedunt."

In judging of the effects of bloodletting on inflammation, it is important to observe, that the remedy may be highly beneficial, even in cases where the inflammation may extend, or the effusions consequent on it increase, after its use. It may often be observed, as in cases of pneumonia, that after full bleeding, the fever subsides, and the breathing is considerably relieved, but nevertheless the indications by auscultation and percussion, of the extension of the effusion in the lungs and pleura continue for some days. But if the febrile symptoms do not return, and the breathing continues easy, it may nevertheless be confidently predicted that, under proper management, and in a sound constitution, the case will terminate favourably, and the effusions gradually disappear, by absorption and by expectoration. In such cases it seems quite reasonable to infer that the intensity of the inflammation and the quantity, probably also the density, of the effused fluids, are restrained by the bleeding, and the latter kept within the limits which the natural action of absorption can remove; and from what we may often observe of the progress of erysipelas on the skin, in the more inflammatory cases of that disease, which are moderated and prevented from extending inwards to the cellular membrane, although not prevented from spreading along the surface, by bloodletting and analogous remedies, we may feel warranted in adopting this conclusion. But this consideration seems to have been in some measure neglected by Laennec and others in France, whose attention has been so much fixed on the physical indications of effusion and disorganisation of the lungs, and whose estimate of the value of bloodletting in inflammations within the chest is much lower than that which most practitioners in this country have been led, from their observation of such diseases, to adopt. It is in a few cases only that bloodletting can be said to *cut short* inflammation; the more usual effect to be hoped for, is more correctly expressed by saying, that it *disposes it to a favourable termination.*

While such benefits are to be derived from the prudent use of bloodletting in the strictly inflammatory diseases, and in their early stage, it is equally certain that in diseases not strictly of that type, and in the advanced stages even of the best marked inflammations, it may either aggravate and prolong the disease, or even rapidly and considerably determine its fatal event; and nothing, therefore, can be more important for the young practitioner than the diagnosis of the truly inflammatory diseases, of the very various intensity with which

they attack different persons, and of the degree of lesion of structure which may in any individual case have been already effected by them.

The symptoms by which such distinctions are to be established belong, of course, to individual diseases, and cannot be advantageously stated here; but there are two symptoms common to all inflammatory complaints, and often guiding in a great degree the use of bloodletting, on which a few observations may be made; these are the state of the pulse, and the state of the blood, in inflammatory diseases.

In inflammatory diseases, the pulse may very often be distinctly observed not only to be *more frequent*, but also to be *fuller*, *i. e.* to cover a larger surface of the finger, and give the sensation of a greater expansion on each systole of the heart,—to be *firmer* or *stronger*, *i. e.* to be less compressible,—and to be *sharper*, *i. e.* each of its pulsations to take place more suddenly* than in health; and when bloodletting takes a favourable effect in these diseases, or when they are spontaneously subsiding, it may be observed to become not only less frequent, but also smaller, more compressible, and softer. In general, it may be stated, that the more distinctly all the deviations from the natural state of the pulse can be observed in inflammatory diseases, we have the more confidence in bloodletting as the appropriate remedy; and that hardly any case of inflammatory disease demanding the remedy occurs, in which a deviation from the natural state in one or other of these particulars is not sufficiently obvious. But there are many cases of active inflammation admitting of the most essential benefit from bloodletting, in which one or more of the peculiarities here stated are absent. In one stage of inflammation within the cranium we have very often the slow but firm and sharp pulse, observed also in certain cases of inflammation within the abdomen; and in many cases of peritonitis and enteritis we have the frequent but small pulse, sometimes not distinctly harder or less compressible than in the natural state. It is also to be remembered that in youth the pulse is easily excited to a state differing from the natural in all the particulars above noticed, in the early part of febrile complaints which are not inflammatory; and again, that in old age, when the arteries have lost somewhat of their elastic power, and transmit impressions from the heart with less modification than in the natural state, particularly if the heart is at the same time affected with any degree of hypertrophy, the pulse is generally fuller, firmer, and stronger, or even sharper, than in the natural state.

In regard to the buffy coat in the blood, there are occasional anomalies which are not yet understood; but the general fact is, that when inflammation is intense, there is not only a thick but a firm or contracted layer of coagulable lymph on the top of the crassamentum, implying that the particles of the fibrin have not only separated more completely from the colouring matter, but aggregated together more closely, or probably have continued longer under the influence of that vital property of attraction among themselves on which coagulation depends, than is usual. The formation of a thick but loose and flocculent buffy coat is often observed in complex cases, as in typhoid fever, combined with local inflammation; implying apparently that, although the separation of the fibrin from the colouring matter is complete, the vital property of attraction in its own particles is soon extinguished, and this gives much less encouragement to the repetition of bloodletting.

If, however, as is most probable, the blood acquires this change of property by passing through the vessels of the inflamed part, it is easy to understand that, for some time after even intense inflammation has set in, the buffy coat will be slight or even imperceptible; and again, that when inflammation of some standing is declining, or still more, when it has passed into the stage of suppuration or ulceration, the buffy coat will still be found in perfection; and

* This last peculiarity Dr. Rush distinguished by the term quickness, as distinguished from frequency; and it is really denoted by the artery springing quickly against the finger, and as quickly subsiding again; but the term sharpness is certainly that which in common language is most generally applied to it.

therefore, that its absence or slight degree in the early stage of inflammation is no reasonable objection to bloodletting; and that its presence in the advanced stage (especially if suppuration is going on) is no indication for the remedy: which are accordingly approved practical observations.

The quantity of blood which should be taken in a case of well-marked inflammation, seen in its early stage, should never be prescribed beforehand, the only sure rule being to continue the loss of blood until either the pulse is affected, or giddiness and faintness are felt, or the local symptoms are decidedly relieved. Dr. Cullen's statement, that for an adult, previously in ordinary health, any thing below 12 oz is to be regarded as a small bleeding, and any thing above 16 as a large one, may be held to be a fair average. From strong full-blooded men, distinctly affected with inflammation, from 25 to 35 oz may often be taken with signally good effect. A single bleeding, even although carried to syncope, is seldom sufficient to control a well-marked internal inflammation; and Sydenham's estimate of 45 oz as the average quantity requisite to meet the danger of a decided pleurisy, is not excessive. Dr. Clark's statement as to young children, that 3 oz are a full bleeding from a child of one year, but that $2\frac{1}{2}$ or 2 may be taken at that age within a day or two, and even repeated in obstinate cases, may likewise be quoted as a judicious one. Three leeches, bleeding well, are a full bleeding for a child of one year, at least of the average strength of those brought up in great towns; and if one is added for each year of the child's age up to five, a fair number for a single evacuation may be obtained. Beyond this age, in strictly inflammatory cases, bleeding at the arm is certainly to be preferred.

There are a certain number of cases in which the symptoms of inflammation in its early stage, both local and general, either continue more obstinately, or occur more frequently, than usual, and in these it is of much importance to be aware how far the remedy may sometimes be carried with good effect. There are various cases on record of pneumonia beginning with unusual intensity, in which 70 or 80 oz within 12 hours, or 100 within 24, have been taken with success, and in some of these farther bloodletting was necessary before the disease finally subsided. The late Dr. Gregory used to quote the case of a medical man in Edinburgh (at this moment in perfect health) who was bled to the extent of 127 oz in 27 hours (102 of these within 5 hours), by his own direction, in incipient pneumonia, which was thus completely subdued. Of the repeated occurrence of the disease, the most remarkable example that occurred in the practice of the same eminent teacher, who is well-known to have had much experience in such cases, and to have watched the effects of the remedy with great accuracy, was one of repeated attacks of pneumonia, confining a patient to his room for three months, in the course of which he lost precisely 392 oz of blood from his arm, and from which, in the end, he recovered perfectly. Mr. Cline had a case of concussion of the brain in St. Thomas's Hospital, in which 320 oz were taken within three weeks, with success.

It is hardly necessary to say that such cases are not quoted as models for general imitation; a great majority of patients, in the most decidedly inflammatory diseases, would certainly sink under a much less active treatment, or pass into a state obviously forbidding the use of the lancet; but when we meet with cases where the early symptoms of inflammation resist obstinately, or recur frequently, it is of the utmost importance to know how far the ordinary remedies may be carried, under prudent management, with success; and it may be confidently stated that no cases afford a more pleasing retrospect than those in which cautious perseverance in the use of this "summum remedium in maximis morbis" has been ultimately rewarded with complete success.

The question of the comparative usefulness of general and local bloodletting in internal inflammations is not easily decided, but fortunately, in each individual case of severity, it is quite possible to try both, and be guided by the effect observed. No doubt can be entertained as to the importance of local bleedings succeeding venesection, in all inflammatory diseases where the symptoms do

not speedily yield to the lancet; but in a case of decided idiopathic internal inflammation, attended with general fever, it may be confidently stated that early, and if the symptoms continue, repeated, bleeding at the arm should certainly never be omitted; excepting only in the case of inflammation of the heart, supervening on rheumatism; in which case repeated local bleedings, chiefly by cupping, are attended with more satisfactory results than bleeding at the arm. And in the case of the pericarditis in particular, it is easy to understand that full general bleeding will be attended with a danger quite peculiar, from the pressure of the effused fluid on the surface of the heart being naturally most injurious when the blood distending its cavities is subjected to sudden and great diminution of quantity.

The dangers to be apprehended from excessive or injudicious bloodletting, especially from the frequent repetition of the remedy, form a subject of great practical importance, of which a general outline only can here be given.

The danger of immediate death from the hæmorrhage, in the hands of an attentive practitioner, may be regarded as trifling, there being always some warning, from the first symptoms of syncope, with or without spasms, of the time when it is prudent to stop a single bloodletting; and generally such indications of general debility and of enfeebled circulation, from the compressibility of the pulse, coolness of the skin, deficiency of mucous secretions, particularly dryness of the tongue, &c., as sufficiently inform us when the repetition of the remedy has become a matter of doubt and delicacy at least, if not absolutely inadmissible. But it must be allowed that there are many cases in which the system is powerfully affected by loss of blood, in which the repetition of the remedy is dangerous, if not immediately, at least in its ultimate result in the disease; and in which, nevertheless, there is a fallacious degree of fulness and even strength of the pulse, and a combination of symptoms which to those unaccustomed to observe them might seem to denote determination to the head, perhaps inflammation of the brain, and to demand farther loss of blood.

Of the possibility of this fallacious fulness and even sharpness of the pulse (generally a somewhat tremulous and easily compressed, but nevertheless sharp pulse, according to the notion formerly explained as being annexed to this last term), some of the experiments of Dr. Parry on animals killed by repeated bleedings, and in which the pulse was "full and bounding" almost to the moment of death, afford unequivocal proof. And it were easy to quote practical observations by Rush, Armstrong, Marshall Hall, Travers, and others, illustrating this "reaction after the loss of blood;" which may perhaps be most correctly described as a modification of the inflammatory fever, produced in a great measure by the loss of blood, and persisting after the local inflammation has subsided or passed into a state no longer demanding evacuation. This peculiar febrile state is marked by the frequent, full, vibrating, or sharp, but easily compressed pulse, with heat of skin, generally, however, not persistent if the bedclothes are removed from the part felt,—generally with sense of palpitation and of throbbing in the head, and tinnitus aurium; sometimes impatience of light and sound;—the symptoms aggravated, and vertigo produced by the erect posture; the face and lips pale, and all muscular motion difficult and generally tremulous. This state occurs chiefly in females of irritable constitution; and is best relieved by alternation of laxatives and opiates, often with the cautious use of wine, ammonia, or other stimuli. Where it coexists, as occasionally happens, with pretty urgent symptoms of local inflammation, it presents a case of much difficulty, but in which, although blood may often still be taken locally, general bloodletting is certainly inadmissible.

The idea of subsequent injury to the constitution, from the use of bloodletting, in inflammatory diseases, and particularly the idea of dropsy being thus produced, may in general be regarded as quite visionary. In persons liable to nervous affections, particularly to the various forms of hysteria, it is certainly true that an aggravation of that tendency is to be expected; which, however,

will in general be only temporary, if the inflammation has been effectually subdued. One of the chief practical evils which is always to be apprehended from large and repeated bloodletting is, that it always increases the facility with which the surface of the body may be chilled, and therefore the liability to relapse, or to the excitement of fresh inflammatory disease, perhaps of worse character, on any subsequent exposure to cold.

But the principal cautions which it is necessary to keep in mind, as to the use of bloodletting in inflammatory diseases, have reference, not simply to the subsequent effects of the evacuation on the system, but to the alteration to be expected from it on the progress of the existing disease; and in this view we must always carefully attend — 1. to the *period of the disease* at which we are to use the remedy; 2. to the kind of the inflammation; and 3. to the complication which may exist of inflammation with other diseases.

1. When we say that the period of the disease, even in cases of healthy inflammation, often decidedly contra-indicates, and still oftener makes us doubtful as to the result of bloodletting, we do not mean merely the number of days from the first decided attack of the disease (although that always demands attention); but we must attend particularly to the proofs of effusion or disorganisation consequent on the inflammation, having already made such progress as to indicate that the alteration of structure already effected, rather than the alteration of action which leads to it, demands our chief attention. And in general, as already remarked, this may be apprehended when we see a *manifest change in the constitutional or febrile symptoms*, attended with *continuance or increase of the local symptoms*. When the pulse has become slow or irregular, at the same time that the pain of head has passed into delirium or coma, in phrenitis or hydrocephalus; when it has become soft and compressible, or very frequent, or when the fever has taken the form of hectic, in inflammations within the chest, while the cough, or the dyspnœa has continued and increased; when rigors have supervened on hepatitis; when a soft and compressible, or very frequent pulse, and cold sweats, have taken place in enteritis, without relief of the bowels or abatement of the tenderness of the abdomen, thoracic respiration, and vomiting; we may always suppose that effusions have taken place to a considerable extent, and that if the inflammation exciting them has not subsided, at least the febrile reaction, by which that inflammation had been supported, and on which bloodletting could exert its chief powers, has so far abated, that the time for active depletion is nearly over. If recovery is possible after this period, a long and slow process must be gone through before it can be perfected, and this will require a certain strength of vital action, and may be frustrated by any means which further depress the vital powers; nay it may, in many instances, be obviously promoted by means which excite the system generally, and stimulate and strengthen the circulation.

In many such cases, more definite information is attainable, particularly in the case of inflammation within the chest, whether affecting the bronchiæ, the substance of the lungs, the pleura, the pericardium, or inner membrane of the heart, — the indication given by examination of the chest and of the sputa, and by auscultation and percussion, prove the extent of effusion, and the degree in which the play of the lungs or heart is impeded by it; and these, taken along with the state of the pulse, heat of skin, and general strength, may often enable us to speak with much confidence as to the question, — always presenting itself in the advanced stage of these diseases, — whether there is more danger from weakening the circulation by bloodletting, when such impediments to the action of parts within the chest already exist, and can only be remedied by a slow natural process of absorption, or from allowing such inflammation as still exists to go on, unchecked by farther loss of blood.

2. That inflammation may exist, of a nature not to be subdued, even to be aggravated, by bloodletting or other evacuations, is quite certain from such experiments as those of Magendie as to the eye, and of Gendrin as to the stomach; in which the kind of inflammation of mucous membrane formerly men-

tioned was brought on by inanition, and could only be relieved by fuller nourishment, restoring the strength of the circulation, and probably restoring to the mucous membrane its natural protecting mucus; and that the kind of inflammation which is recognised in a patient affords very often a reasonable ground of objection to full bloodletting, is sufficiently obvious when we attend to the known history of scrofulous, rheumatic, and gouty inflammation. In the first of these, it is true, that on occasion of a recent inflammatory attack, when the symptoms approach most nearly to those of healthy inflammation, we have every reason to believe that bloodletting is often of the most essential importance, preventing aggravation of disease already existing, or arresting disease which would otherwise be established. But it is equally true that scrofulous inflammation is less under the influence of bloodletting than healthy inflammation; and farther, that scrofulous diseases occur chiefly in weakly persons, in those whose mode of life in early youth has been debilitating, and in those recently weakened by any considerable evacuations. Therefore, by full and repeated bloodletting in scrofulous cases, while we make little impression on the inflammation that exists, we incur a great risk of so far lowering the constitution as to make it more liable than previously to fresh attacks of inflammation, or to other scrofulous diseases, perhaps not inflammatory in their origin.

Again, the recorded experience of all ages informs us (whatever we may conjecture as to the explanation of the fact) that the inflammation both of rheumatism and of gout is very liable to metastasis, and that, although it may often be moderated (particularly that of acute rheumatism in a healthy constitution) with very good effect by evacuations, yet it is by no means desirable that it should suddenly recede from the extremities; because if it does, inflammation in a more vital organ, or in the case of gout, a kind of internal neuralgia, even more immediately dangerous, is very likely to follow.

In the case of erysipelas, to a certain degree, and in that of all the specific inflammations of the skin already noticed, in a much greater degree, the nature of the inflammation may also be urged as a reason against full bloodletting, and in favour of the strictly "expectant practice;" but these are cases either of inflammation without fever, or of inflammation complicated with another and generally more formidable disease, falling therefore under the next head.

3. The complications of inflammation which often contraindicate bloodletting, and always impose the necessity of caution in regard to it, are in a general view of two kinds; that with other febrile and particularly contagious diseases, and that with chronic and particularly organic diseases.

In regard to the complication of inflammation with idiopathic fever or with the contagious exanthemata (in which we include erysipelas), the general principle is, that such inflammation, whether of the kind that is essential to and characteristic of the disease, or of that which is only an accidental concomitant, is never the sole, and seldom the chief, cause of danger. The body is under the influence of a poison, generally absorbed from without, which gives a peculiar character to the inflammation, and likewise excites a peculiar form of fever, often very dangerous when the inflammation, external or internal, is trifling. In the course of the disease, the poison, after being enormously multiplied, by some mysterious process, is expelled from the body. Whether the inflammation is part of the process by which this expulsion is effected, is indeed doubtful, but it is certain, that in most of these diseases, the inflammation, at least that which is characteristic and peculiar to the disease, cannot be prevented from running a certain course without imminent danger to life.

The danger in the course of these diseases depends often mainly on the depressing effect of the morbific poison, gradually influencing the system at large and especially the fundamental function of circulation, and producing typhoid fever; but it often depends on the combination of the depressing influence with inflammation, internal or external; and sometimes it depends so

much on the intensity of the inflammation and so little on any general depression of the powers of life, that the disease demands and bears evacuations nearly as in idiopathic inflammation. In judging of the degree in which the danger of individual cases depends on the one or the other cause, there is of course much room for the exercise of judgment and discretion. One general observation may be made, which is of great practical importance, that in all such complex cases, where contra-indications exist, if bloodletting is to be practised (and in the accidentally concurrent inflammations in many cases of such diseases it is highly beneficial), it should be practised as early as possible, in order that it may be as small as possible; all experience informing us that a very moderate loss of blood in the early stage of inflammation will often produce much more effect on the extension and course of the disease than a much larger quantity at an advanced period.

There is another element which must always be taken into consideration here, which is quite peculiar to such diseases, viz. the nature of the prevailing epidemic; for it is the general result of the observation of medical men in different ages, that, in different epidemics, the type of the same disease so far varies, that the local inflammations may be more frequent and dangerous in the generality of cases occurring in one, and the general typhoid state in those occurring in another. Thus it is the general result of the experience of the present writer and, he believes, of most practitioners who have seen much of the epidemic fevers prevalent in Scotland from 1816 till 1820, and again of those prevalent since 1826, — that bloodletting was both more demanded from the firmness of the pulse and the urgency of local symptoms, and better borne at the former time; and that the danger much less frequently depended on mere depression of the circulation; and again, that, in the latter epidemics, this last part of the symptoms has been much more generally urgent, the use of stimulants has often appeared much more important and beneficial; and that full bloodletting, even early in the disease, has often appeared to exert a very injurious influence over its subsequent progress. Similar observations have been made on different epidemic visitations of all the febrile and contagious diseases.

Of the caution in regard to bloodletting which is imposed by the presence of chronic, and especially of organic disease, we may merely enumerate the cases of inflammation of the lungs or bronchiæ combined with disease of the heart, or with previous long-continued asthmas and its usual attendant, emphysema of the lungs; and again, of inflammation within the abdomen, whether of the serous or mucous membrane there, combined with organic disease of the liver. Such cases are very common, and are very often farther complicated with dropsical effusion, partial or general. It is very important to be aware, and has been ascertained of late years more distinctly than formerly, that none of these complications ought to prohibit bloodletting when the inflammatory symptoms are recent, and the circulation tolerably firm and vigorous. But it is obvious that, in such cases, the system is permanently under the influence of a cause which prevents it from recovering its natural strength after any great evacuation, as it otherwise would do. And in several such cases, a more special cause of danger from much loss of blood may be pointed out, particularly in the cases of advanced bronchitis and emphysematous lungs, in which free expectoration is both difficult and necessary for recovery; and the cases of dropsical effusion, where a mechanical impediment exists either to free circulation or to the expansion of the lungs. It is obvious, from these considerations, that the time during which bloodletting can be beneficially employed in such diseases must be very circumscribed; although it must be admitted, on the other hand, that some cases of all of these occur, in which the strength of the circulation is such as to make it safe and beneficial at a much more advanced period than in others. The case of mechanical obstruction to the flow through the heart, from disease of its valves or of the aorta, unconnected with organic

alteration either of the lungs or liver, is that in which the repeated loss of blood may generally be best borne.

Much has been said, in some systematic works, of age, sex, temperament, habit of body, habits of life, climate, and season, as influencing the use of this remedy; but the fact is, that there is no age, no sex, temperament, or habit of body; no description of human beings, and no climate or season, in which bloodletting may not, on certain occasions, be performed with advantage,—nay there is none in which its neglect may not be fatal. All that can be said on those heads is chiefly important as pointing out the circumstances in which the indications or contraindications already stated are chiefly to be expected, but can hardly be said to establish any new rules.

In early life there is certainly ground for caution—first, because much febrile action may be excited even by slight inflammation, and secondly, because young children are easily depressed by *repeated* evacuations, perhaps especially of blood; and are apt to fall when so affected into the state described by Dr. Gooch, Dr. M. Hall, and others, under the name of hydrencephaloid disease; in which stupor, with coldness and feeble pulse and vomiting, are the chief symptoms, and in which, stimulants are often signally useful.

In very advanced life there is ground for caution, partly on account of the complication with alteration of structure, which may very often be suspected, even when it is not certainly known, and partly because the powers by which the capillary circulation is maintained, and the vital affinities by which the blood is applied to its various useful purposes in the economy, lose much of their efficacy at this time, and the system, therefore, has usually not the same powers as previously of recovering from any debilitating cause.

In regard to sex, it is important to observe that in women, slight inflammatory attacks, with severe pain, and often with much fever, or severe neuralgic attacks, with threatening of inflammation in the spinal cord, in the sides of the chest, and in the viscera of the abdomen and pelvis, often occur, and mislead young practitioners into the belief that violent internal inflammation exists when it does not. But it is not less true that the most intense inflammations occur in them probably more frequently than in men; and it were a fatal error to suppose that the presence of nervous or hysterical symptoms implies the absence of serious inflammation.

In regard to climate, the most truly important observation seems to be, that in hot climates the progress of febrile and inflammatory diseases—at least on Europeans—is accelerated, and the time when bloodletting can be useful of course proportionally circumscribed.

The sanguine temperament is that in which the greatest intensity both of pain and of fever may be expected to attend a given amount of inflammation; and therefore when we have urgent general symptoms attending local inflammation in persons of a temperament much removed from the sanguine (in the phlegmatic or melancholic), we have the more reason to suppose that the inflammation is intense; and if it be in the early stage, that full bloodletting is demanded. But it is of much more importance to observe the degree of strength of habit, than the temperament, in judging of the extent to which bloodletting may be carried. The inhabitants of large towns, partly on account of their more sedentary life, partly of the impure air which they habitually breathe, partly of their less regular mode of life, their more frequent mental anxieties and irritation, are of feebler habits; and all the cautions as to repeated loss of blood apply to them more than to country people. There are indeed many of them, in comfortable circumstances and of regular habits, who bear bleeding perfectly well; but there is a class, well described by Dr. Armstrong, always numerous in large towns, whose subsistence is precarious, their habits irregular, and often dissipated, who are exceedingly prone to inflammations, but have it in a form modified by these circumstances, and especially by the habitual use of strong liquors. In many of these full bloodletting will produce fits of delirium tremens; in others it affects variously the nervous

system; and in all it must be expected to depress the circulation more permanently than in better constitutions. In all such cases, our main resource is the early detection of inflammatory disease, and the early, and because early, moderate, and yet effectual, use of bloodletting.

Having said so much of this our *summum remedium* in inflammatory diseases, we may comprise in a few words all that need be stated in general terms as to the other classes of remedies to be employed in such cases.

1. When inflammation is once near the surface of the body, we have a powerful means of repressing it in the application of cold, which, by causing constriction of the dilating vessels, prevents those congestions and stagnations of blood which seem to be essential to the inflammatory effusions. The application of cold water to a burn, which has caused inflammation, and commencing vesication,—or to a bruise or sprain, affords unequivocal evidence of the power of this agent; but, in order that it may be effectual, it must be applied either uniformly or very frequently and assiduously for many hours together; otherwise the inflammation will start again, as if with renewed vigour, on each cessation of the application, as long as the general strength of the circulation continues, and the remedy will, on the whole, rather retard than hasten its decline; and it is difficult to do this without some risk of the injurious effects of cold. In those varieties of inflammation which have the natural tendency to shift their place, and especially to affect internal parts, it need hardly be said that this mode of repressing external inflammation is inadmissible. Although cold applications may be used in these when the circulation is firm and vigorous, it must be only with the intention of relieving the feelings of the patient,—not to such an extent as to affect materially the progress of the inflammation.

Of internal inflammations, that within the head is that in which the assiduous application of external cold has been most esteemed, both in the way of frequent sponging or aspersion, and in that of occasional stronger affusions; but, perhaps it is rather in cases of subacute inflammation, or determination approaching to the inflammatory state (as in the course of idiopathic fever), that it is most useful. Certainly, in cases of idiopathic inflammation, or of threatening hydrocephalus, it cannot be urged as superseding the active depleting measures. In some cases of peritoneal inflammation, the assiduous external application of cold is grateful to the patient, and probably may assist in restoring the natural state of the bowels: but the application must be strictly confined to the inflamed parts, and this is often difficult. This observation applies still more to the application of cold, practised occasionally on the Continent, we believe hardly at all in this country, in cases of cynanche, especially of croup.

2. Of the various sedative medicines which, at different times, have been highly recommended as capable of controlling both the local and the general disorder in inflammatory diseases, we may assert in general, that no one is generally thought in this country deserving of confidence which is not nauseating; and that the antiphlogistic effect, if not absolutely dependent on, seems very much connected with, the nauseating sensations, and accompanying depression of the heart's action. The effect of digitalis in lowering the pulse is seldom to be obtained without its nauseating effect; and this can hardly be produced within so short a time as the progress of an acute disease demands, without danger of fatal syncope. Whatever may be the specific power of colchicum over gouty inflammation, it is certainly not to be depended on as sensibly influencing simple, or even rheumatic inflammation, unless so used as to nauseate. Several high authorities on the Continent have expressed a confident opinion of the antiphlogistic virtue of tartrate of antimony, when given in large quantity, after *tolerance* of the medicine has been established, and when it produces *no sensible effect;* but such trials as have been made in this country have not, so far as is known to the present writer, established this principle to the satisfaction of the profession. Indeed, according to his experience, the effect of from a quarter of a grain to half a grain of tartar

emetic every two hours during the time of waking, in cases even of well-marked internal inflammation, is distinctly nauseating, when blood has been previously freely drawn; and as the chief beneficial effects of the remedy, as auxiliary to bloodletting, have been observed in connection with the occasional fits of nausea, there has been no great anxiety to observe the effects of pushing the medicine further. The antimonial solution thus used, or other nauseating medicines, is probably the most powerful auxiliary to bloodletting in the early stages of inflammations within the chest, especially in that of the substance of the lungs; and it is a very powerful remedy, also, in those cases of affection of the brain, occurring in fever, in which there is high delirium and an approach to inflammation, though without nausea; but in the early stage of almost all cases of idiopathic inflammation in the head, as well as in those of the abdomen, there is so much nausea and vomiting as obviously to contra-indicate the remedy; and, in all cases, caution is requisite in its use, on account of its sometimes violent effects on the heart's action, and on the stomach and intestines.

3. The most frequently employed of all the auxiliaries to bloodletting are the various methods of *derivation*, of which purging is by far the most generally important. This is the main auxiliary to which we must trust in cases of inflammation within the head; and its use there is the more important that (as Dr. Abercrombie has stated) purgatives may be used fully, and sometimes most efficiently, after the symptoms of effusion consequent on inflammation in the brain, have come on, and when farther loss of blood is useless or even injurious. In inflammation within the chest, although occasional laxatives are proper in the view of lessening the general febrile state, they are of less essential importance; and when there is much expectoration in the later stages, it is generally, and probably justly, thought, that much purging may be injurious.

In inflammation of the intestines, both of the serous and mucous membranes, they were certainly much too generally employed in this country within these few years; but it is now more generally understood that, in reducing inflammation there, they are not only of little efficacy, but always of doubtful, and sometimes of injurious, effect, — that procuring a regular action of the bowels is a secondary object, not to be directly urged until the inflammation has subsided; and that, even for attaining this object, the mildest laxatives and enemata, generally alternated with opiates, are the most appropriate means.

Vomiting appears to be an important auxiliary to bloodletting chiefly in cases of inflammation of the larynx, trachea, and bronchiæ, especially in children, where it seems to have a special effect, partly as an expectorant, and partly as an anti-spasmodic.

The effect of diaphoretics and sudorifics in inflammatory complaints is not easily referred to any fixed principle. In many of them, especially in thoracic inflammation, there is often full sweating without the least alleviation; and it is certainly highly inexpedient, in the height of any inflammatory disease, to urge the use of such sudorifics as produce a manifest previous excitement of the circulation. In the inflammatory diseases of children, in particular, the premature use of the warm bath is certainly often injurious. Yet there are cases of strictly inflammatory diseases, in their early stages, particularly of bronchitis, of dysentery, and of rheumatism, in which sweating, generally succeeding to moderate loss of blood, sustained sometimes for two or three days, and with proper precautions against subsequent exposure to cold, is signally beneficial; and they are perhaps more generally useful when the violence of internal inflammation has subsided.

The use of blisters and other counter-irritants is confined chiefly to peculiar circumstances of inflammatory complaints, — to the later stages of acute inflammation, when the excitement of the system has been so far reduced by bloodletting; to the cases of more chronic or subacute inflammation; *e.g.* to many cases of bronchitis and rheumatism; and again to the inflammation, and especially the slow scrofulous inflammation, of those textures where the whole progress of inflammation is slow: bones, cartilages, and ligaments. In many

of these last cases, the issue or seton is the most suitable and effectual form of counter-irritation. In all forms, the degree of excitement they occasion is a serious objection, particularly in children, in whom also, the ulceration and sloughing, consequent on blisters, if applied only for a few hours, in a feeble habit or in a depressing disease, is often not only troublesome but dangerous.

4. Many practitioners in this country, since the time of Dr. Hamilton of Lynn Regis, have been firmly convinced that there is a peculiar or specific virtue in mercury, affecting the mouth, and especially in the combination of calomel and opium, in arresting inflammation, and controlling the deposition of lymph from it; and that a power of this kind is exerted over the inflammation of the iris, and the effusion of lymph upon it, in many cases of that disease, no one can doubt. But that a similar power is exerted, in a degree adequate to the object required, in any inflammation of internal parts, is much more doubtful. That calomel and opium is a useful medicine in many internal inflammations is granted by all, because the soothing effects of the opium are often desirable, and the calomel is one of the simplest and most effectual means by which some of the injurious effects of opium may be corrected; but the main question, as regards any specific virtue of mercury, is this — Do the symptoms of inflammatory diseases subside more rapidly, and more certainly, when the mercury has affected the mouth than without that occurrence? and on this point the present writer cannot hesitate, after considerable experience, to reiterate an opinion he formerly expressed, that he has more frequently seen them aggravated, or transferred to another part, on that event taking place, than relieved; and that the cases in which that combination has always seemed to him most useful have been those in which, the symptoms having subsided, it was withdrawn without the mouth being touched.

5. That opium is an important and valuable auxiliary to bloodletting in abdominal inflammations, is a principle which we consider to be firmly established by the practice of various physicians in this country, and perhaps not duly appreciated in others. It appears to us that its value (except as a mere palliative to uneasy feelings) is nearly confined to the inflammations of the intestines, enteritis, and dysentery, and that it is important in them not to diminish the quantity of blood which should be drawn to subdue the inflammation, but to relieve those very oppressive sensations which seem to be the connecting link between the inflammation in the intestines and the actions of the heart, and by which these actions are so often rapidly and irretrievably depressed. Under the full use of opium, after bleeding in these diseases, these feelings are often relieved, vomiting allayed, sleep procured (whether with or without sweating does not appear to be material), and the pulse is found to rise in strength; and if, as very generally happens in well-marked cases, the inflammatory symptoms recur, bloodletting may be repeated again and again, without symptoms of sinking. The disease is placed, as to its possible duration, and the effects of repeated bloodletting, more on a footing with inflammations of other parts, than it is when this auxiliary is omitted. Under this treatment, we can say with confidence, that the success of treatment in these inflammations, when attended by the peculiar depression of the circulation, and when the inflammation is of the healthy character, as distinguished from the erythematic and often epidemic peritonitis, is very considerably greater than when opium is withheld.

6. There is yet another class of remedies of great and certain efficacy in certain circumstances of inflammatory diseases, although of course requiring much discrimination in their use, viz. the stimulants. These are admissible, of course, only in the later stages, but sometimes sooner than the indications for local bloodletting, or the time of its useful employment, have ceased. They may be demanded by two distinct considerations: 1. By there being such indications of debility or definite action in the pulse, skin, tongue, and voluntary muscles, as are in themselves very dangerous, and may render a local disease fatal, which might otherwise either have abated or passed into a chronic

and comparatively inert state. 2. By certain consequences having already resulted from the inflammation, known to be irremediable for the time, but admitting of a subsequent slow process of cure by the provisions of nature, provided a certain amount of the vis vitæ in the system in general can be maintained for the requisite time.

Dr. Abercrombie has shown that the deadly paleness and coldness, with cessation of the pain, and sinking of the pulse, so often seen and so generally fatal in the last stage of enteritis, may in a few cases go off under the cautious but continued use of stimuli. There is no case in which more decided beneficial effects can be observed in some instances from stimuli, than the advanced stage of bronchitis, when the breathing is very short and hurried, the mucous and subcrepitous rale general on both sides of the chest, the skin cool, and the pulse sinking. In some such cases, the breathing is relieved by full expectoration, obviously promoted by the stimuli; but in others it gradually improves as the pulse rises in strength, although the expectoration is scanty. It has happened to the present writer repeatedly to meet with cases of the true peripneumony (no doubt partial) marked by the peculiar sputa, with the absence of respiration in the affected part of the chest,—neglected until their advanced stage,—attended with a similar depressed state of the circulation, and recovering (of course with some permanent injury to the lungs) under the use of stimulants exclusively, taken in such quantity, and followed by so rapid abatement of the most distressing symptoms, that they could not be supposed to have exerted no influence on the disease.

Again, although there be no such immediately alarming symptoms, if bronchitis has produced general effusion into the bronchiæ (as in many advanced cases of asthma and of hooping-cough); if a portion of lung has been consolidated; if an extensive and probably partly puriform effusion from decided inflammation has taken place in the cavity of one side of the chest or abdomen; if an abscess has formed in the liver; if a portion of the mucous membrane of the intestines has been thickened by effused lymph and then passed into ulceration; if a bone has become carious, a cartilage has ulcerated, or even a capsular ligament of a joint been much thickened by inflammatory deposits; if the cornea has been affected, first with pustules and then with ulcers, from the strumous form of ophthalmia,—whatever influence local remedies may or may not have in such lesions, it is certain that a long process of absorption, of ulceration, of healing by granulations, &c. in these different cases, must be gone through; and that a certain degree of strength of habit is necessary, that these processes may go on favourably. We know, from experiments on animals, that inflammation, with all such consequences (*e. g.* in the eye), may be produced, if not merely by inanition, at least by causes acting on a very exhausted system, and producing this effect by reason of the exhaustion; and that all may be removed merely by giving sufficient nourishment; and therefore we can easily understand, what experience abundantly demonstrates, that not only the antiphlogistic remedies after a time must be discontinued, but the antiphlogistic regimen relaxed, even sometimes at the risk of temporary aggravation of part of the disease, in such cases; and that the best effects should result from the gradual introduction of a tonic regimen, from country air, exercise, moderate mental excitement, and a gradually improved diet. Such cases illustrate nothing so strongly as the mischief which may be done by practising for the names of diseases; and forcibly remind us of the judicious aphorism of Boerhäave "Nullum remedium in morbis cognovi, quin solo *tempestivo usu* tale fiat."

FEVERS.

GENERAL DOCTRINES OF FEVER.

Definition. — Forms of fever. — Local diseases in fever. — Theories respecting the nature of continued fever. — Exanthematous or eruptive fevers. — Classification of fevers.

FEVER (*febris*, from *fervere*, to glow, to be hot) is so named, from one of its most prominent symptoms — a sense of increased heat.

The term has a double signification, both in nosographical and in familiar professional language. For sometimes it is applied, especially in the plural number, to all febrile diseases, including primary fevers, eruptive fevers, and acute local inflammations. And at other times it is used, particularly as a singular noun, to denote primary fevers only, or fevers proper; while, for embracing the whole class of febrile diseases, the more generic term Pyrexiæ is commonly employed; which however, according to its original meaning (from *πυρέσσω*, *febricito*, derived from *πῦρ*, *ignis*), does not essentially differ from the more specific term, fever.

It is in the restricted signification, implying those febrile diseases where the pyrexia is simple, or not combined, at least necessarily, either with eruptions of the skin, or with local inflammation, that the subject of fever will be here in the first place considered.

Fever has been variously defined. Probably no better definition can be found than the following, a modification of that sanctioned by Cullen: — *After a preliminary stage of languor, weakness, and defective appetite, — acceleration of the pulse, increased heat, great debility of the limbs, and disturbance of most of the functions, without primary local disease.* It is a singular instance, however, of the extreme difficulty of arriving at correct nosographical definitions, that scarcely any one of the characters here assigned is absolutely invariable; nor is it likely that any other definition will be found, which is not subject to the same defect.

Forms of Fever. Fever presents itself in a very great variety of forms. The most precise mode, perhaps, of regarding them in connection with one another, is to proceed at the outset from the simplest of them, *ephemera*, or one day's fever. Ephemera, so called because it seldom lasts above twenty-four hours, begins with chilliness or rigor, paleness, weariness, a frequent small pulse, and indifference to food. These symptoms are followed in half an hour, or a little more, by heat of skin, flushed face, frequent hard pulse, occasionally headach, and a peculiar sense of fatigue, restlessness, and slight soreness in the muscles, to which the name of febrile sensation, or febrile anxiety, has been conveniently given. When this state has continued for twelve, eighteen, or at most twenty-four hours, gentle perspiration breaks out; under which, in the course of little more than another hour, every essential symptom vanishes, leaving behind some exhaustion, muscular debility, and feebleness of the appetite. This disease, the simplest and slightest of all forms of fever, although on account of its shortness it seldom attracts much notice, is nevertheless not uncommon during the irregular weather of our spring months in Britain.

If such an affection be supposed to recur several times every other day, with an interval of comparative health in the intervening days, a clear idea will be formed of *intermittent* fever in its most frequent and characteristic shape —the tertian type; and from the tertian may be derived all the other forms of intermittent. If, in the next place, the febrile state be conceived to be reinforced twice a-day, or oftener, by a fresh attack of rigor or chilliness, with subsequent reaction, before the pre-existing pyrexia has materially subsided, a distinct conception may be formed of *remittent* fever. From remittent fever most nosologists

deduce the only remaining primary type, *continued* fever, by supposing the remissions to become gradually less and less distinct: and this view may seem so far conformable with nature, that almost all continued fevers present, more or less, a tendency to regular or irregular remissions, especially for some days at the commencement. But it is perhaps fully a clearer and certainly a more direct way of deducing them, to conceive the ephemera merely prolonged to such a duration, as that its several stages occupy between four and nine or eleven days, thereby constituting, in the first instance, the simplest of all forms of continued fever, usually known by the specific name of inflammatory fever, or *synocha*.

It is probable that inflammatory fever is the fundamental type of all primary continued fevers. It is acknowledged that all primary fevers, but especially those of the continued type, even in its simplest form of inflammatory fever, present, in comparison with other febrile diseases, a great degree of debility, or exhaustion of the nervous system; which is marked among other symptoms by great muscular feebleness, both during the prevalence of febrile action, and for some time also during convalescence. Now sometimes, where inflammatory fevers are disposed to run a longer course than usual, the symptoms of nervous depression, aggravated undoubtedly by the pre-existing reaction of the circulating system, come to constitute in the latter stage the most conspicuous character of the disease; and in particular they veil more or less, and even sometimes overwhelm, the original character of pure reaction that distinguished the earlier stage, thus giving rise to extreme muscular depression, and disturbance of the powers of the mind in the shape of stupor, with or without delirium. Such a sequence of pathological phenomena conveys the clearest idea of the second well-marked variety of continued fever in its simplest form, which is commonly known to nosographists by the name of *synochus*. At other times again, the symptoms of exhaustion and disturbance, becoming still more prominent, show themselves at an earlier period along with the signs of reaction of the circulation, that is, before the close or even near the beginning of the first week; and thus they constitute the most striking general character of the disease throughout, and in some cases even become excessive from the very beginning. Fever, in this shape, forms the *typhus* of nosographists — a term, which of late has passed into unprofessional language, and thereby acquired a vague meaning, almost equivalent to the generic word, fever.

The three types of continued fever, synocha, synochus, and typhus, are the species which were admitted by Cullen into his nosological system. Since his time, some have called in question the existence of the first type; others have multiplied the species. Many have doubted, and not a few have boldly denied, that such a thing as a primary fever, properly so called, is to be found in nature. But all that has been attempted in this particular corner of the theory of fevers since Dr. Cullen wrote, has had scarce any other tendency than to embarrass and obscure the subject. Much has been done for the pathology of the various forms of fever by the researches of pathological anatomists; and the knowledge now possessed of its secondary affections has in consequence acquired an extent and precision, which in his days were unknown and indeed unattainable. But the views entertained of fevers in the abstract have not been rendered clearer; and many dogmas have been maintained, and still receive currency, which, in so far as they do not seem true to nature, cannot be supposed likely either to advance medical theory, or to benefit medical practice.

All forms of continued fever, excluding always from that term eruptive fevers and acute local inflammations, may be arranged under the three types here specified. All forms which have been distinguished from them by medical writers in recent times may be viewed, both philosophically and practically, as nothing else than varieties, presenting peculiar features imparted by incidental concomitants, yet not the less essentially belonging either to one of the three Cullenian types of continued fever, or to remittent fever. There is some

difficulty in assigning its true place to one particular variety, which, under the name of yellow fever, has deservedly attracted great attention, on account of its frequency in various quarters of the world, as well as the peculiarity of its nosological characters. But it is in all probability nothing else than a remittent, possibly, however, sometimes a typhoid continued fever, with incidental or secondary accompaniments. There is also some difficulty in assigning a true place among primary fevers to those disorders, which have been termed in modern times gastric fever and gastro-intestinal remittent. It seems well-ascertained that the same irritations, which will excite local inflammation in the stomach or intestines attended with symptomatic fever, may also at times excite the febrile state independently of positive inflammation. This happens particularly in the irritable constitutions of children, but may also occur in the more robust habits of adults. The fevers thus arising may generally be distinguished from the primary fevers of the continued type unconnected with a local cause in the body, as well as from intermittents, and those commonly ranked as remittent fevers. But they tend in various circumstances to assume the form, sometimes of one, sometimes of another of these fevers; and are occasionally with difficulty distinguished. In a nosological arrangement they form the passage, as it were, between primary fevers and febrile inflammations; and will be so considered in this work.

Local Diseases in Fevèr. Fevers seldom present themselves in actual practice with the simple characters, which, for the sake of precision, have been supposed in the preceding statement. The phenomena described above constitute the broader features by which they may be grouped in genera and species, for the purpose of convenient classification. But in special cases each kind of fever presents complications, by which its essential characters may be more or less obscured, and which become most important objects in the treatment — more important, frequently, than the febrile state itself.

These complications seem to arise from one organ or set of organs being disturbed in their function beyond the rest, owing to constitutional predispositions, or other incidental cooperating causes. There is scarcely any end to their multiplicity. But by far the most frequent and the most important of them may be classed under the general head of local inflammations; and the greater part of the remainder under that of local irritations. Local inflammation confessedly, and in all probability local irritation also, may subsist as a primary affection, giving rise to the febrile state as symptomatic or secondary to the local disturbance. But there can be as little doubt, that such local disorders may likewise prevail incidentally in the course of primary fevers; that, although occasionally absent, their presence is on the whole the more general rule.

Local inflammation in particular has even appeared to some modern cultivators of pathology to be so invariable an accompaniment of what are called primary continued fevers, that they have been led to call in question the existence of any true primary fever, and to maintain that fever of every kind is constantly a symptomatic affection — a phenomenon secondary to inflammation in some special organ. The doctrine here alluded to, which has gained not a few converts in this country, and which, on the Continent, but especially in France, seems at the present time to predominate, is of so much consequence, both as striking at the very root of the theory of fevers previously current, and also as involving practical precepts of high importance, — that a necessity arises for considering the subject in the present place in some detail. And the necessity becomes not the less urgent, if it be true, as appears highly probable, that the doctrine in question, however specious, and however widely disseminated, is in reality untenable, — being founded, like many other hallucinations in physic, upon narrow, though so far as it goes, correct enough, observation.

Nature of Continued Fever. It may be well to introduce this topic with a short historical sketch of the principal opinions which have at different times been held of the nature of fever. A preliminary statement of these opinions can scarcely fail to have at least one good practical tendency. The picture thus pre-

sented to the mind, of the successive revolutions of sentiment that have taken place as to the theory of fever, of the ingenious absurdities which disfigured the early history of medicine, and of the plausible, yet not less visionary substitutes, which the authorities in every new era of medical science have devised, rather to the discomfiture of their predecessors than to the stability of their own credit, — should teach due caution in adopting the still newer devices of the present day, even though they do seem to be based on the sober discoveries of a faithful system of generalisation, guided by a sound pathology.

The ancient physicians were naturally led by the more prominent and tangible phenomena of the disease, namely, the altered state of the several excretions, to imagine that fever essentially depends on a morbid state of the animal fluids. This doctrine, espoused at the revival of letters in the fifteenth century, acquired soon afterwards a more definite shape under the speculations of the alchemysts; and fever was held to be the result of a contest between acid and alkali within the body. For a long time afterwards the fluids, or humours, were almost alone looked to for an explanation of the phenomena of fever; and hence the followers of the doctrine then in vogue have usually been designated humoral pathologists, or *Humoralists.*

The doctrines of Humoralism held undivided sway over the minds of physicians, in one shape or another, till the close of the seventeenth century. About this period they constituted a part of the theory of *Stahl,* who maintained that fever arises from plethora or fullness of vessels, and cacochymia or a depraved condition of the fluids; that it consists essentially of an effort of nature to get rid of these morbid states; and that the effort is accomplished under the direction of a soul, autocrateia, or governing principle within the body, which acts without any physical necessity, and purely through its own intelligence. The theory of Stahl obtained wide circulation. Like the doctrine which it displaced, it gave rise to grave practical errors. The views of the alchemysts engendered a vain confidence in chemical remedies, for neutralising or otherwise correcting the morbid condition of the fluids. The views of Stahl, by assuming the intervention of a free agent within the body, or an inherent *vis medicatrix,* inevitably led to an undue reliance in nature alone for the issue, and to the adoption of what has been aptly termed the *medicina expectativa.* So extravagant was the length to which his followers carried his principles in this respect, that some of them even established the sincerity of their creed by declaring their opinion, that fever is a salutary operation, which scarcely merits the name of a disease, — "*ne quidem morbum vocari mererere.*"

The attempt made by Stahl to call in the aid of an intelligent governing principle to account for the phenomena of fever, probably gave rise to the first decided improvement in this branch of pathology, which consisted in some share of influence being allowed to the operations of the nervous system. For this step, as well as for delivery from the trammels of a pure Humoralism, medicine is mainly indebted to *Hoffmann.* Hoffman maintained that fever consists in spasm of the capillaries, which engenders reaction of the circulation as the means by which the spasm is to be overcome; and he referred the cause of spasm in the capillaries to some morbid affection of the nervous system. In consequence of looking chiefly to an altered state of the solids as the essence of fever, Hoffmann and his followers have usually been termed *Solidists.* To this theory Cullen afterwards gave more precision by maintaining, that the first incident in the chain of sequences constituting fever is a depressed state of the brain and nervous system; that spasm of the extreme capillaries results from this depression; and that reaction of the circulation, with its accompanying phenomena, is an effort of the system to overcome the spasm. The Cullenian theory, in a modified form, continues still to be the prevailing creed of those who adhere to the tenets of Solidism, and who believe at the same time in the existence of primary or essential fever.

Although the eminent reputation of Hoffman and of Cullen quickly attracted

crowds of proselytes to the doctrines of Solidism, the ranks of the humoralists were still by no means deserted. About the same period Boerhäave, while adopting the principles of Solidism for the basis of his opinions, nevertheless admitted also the cooperation of chemical changes of the fluids in producing fever. Even Cullen himself allowed, that in certain circumstances the fluids underwent morbid changes; but, in accordance with the principles first clearly propounded in the preceding century by *Baglivi*, he held that these changes were the consequence, not the cause, of the disease. In recent times an attempt has been made to revive the humoral pathology by a more accurate chemical examination of the fluids, and in particular of the blood. The facts which have been ascertained certainly seem to show, that a morbid state of the blood may perform an important part in developing some of the phenomena of fever. But the discoveries thus made are very far from bearing out the conclusion, which has been drawn from them by some of the cultivators of this line of inquiry, for example by *Dr. Stevens*, that fever is entirely and fundamentally owing to the changes in question.

So much attention has of late been drawn to the investigations of Dr. Stevens, and the facts on which his theory is founded, as well as the practical conclusions to which it leads are of such a nature that it is entitled here to more particular notice. According to his observation, confirmed by that of other practitioners in hot climates, the blood in the marsh-remittent of the West Indies, and in yellow fever, which he considers a variety of infectious typhus, undergoes important changes in constitution. Even for days or weeks before the disease breaks out, the blood, in persons who have been for some time exposed to the poisonous effluvia, is usually dark, its serum brownish or yellow, with colouring globules precipitated through it, and its venous tint incapable of being thoroughly turned to arterial red by contact with air or various salts. These morbid characters Dr. Stevens seems to suppose, though he nowhere states so categorically, are owing to a diminution of the saline ingredients of the blood — those ingredients which he was the first to prove, by a set of very interesting experiments, to be essential for a healthy process of arterialisation in the lungs. As the disease forms and advances, this morbid condition of the circulating fluid increases. The salts become less and less abundant; and, in consequence, the blood becomes progressively darker, the serum more coloured, the clot looser and looser, like ill-made currant-jelly in consistence, and the modena tint of the venous blood less and less capable of becoming florid under exposure to air or saline solutions, till at length what is found in the dead body undergoes no change with either agent, or even with both together. These progressive changes he maintains to correspond invariably with the progress of malignant symptoms. And, on the contrary, it is alleged, that if the morbid state of the blood is encountered in time by the administration of neutral non-laxative salts, allied to those usually found in the blood in its healthy condition, this fluid quickly recovers its healthy characters, amendment speedily ensues, and the mortality from one of the severest scourges of man in hot climates is reduced to a mere insignificant fraction. Dr. Stevens's theory therefore is, that the poisonous miasma of marsh-remittent, and the infectious effluvia of yellow fever, alter the condition of the blood, especially by removing its saline ingredients; that this diseased state is the cause of such fevers; and, more particularly, that its gradual increase is the occasion of all the malignant symptoms, and of death. But he does not confine his inferences to the fevers which he has practically investigated. He holds in general terms, that "all essential or idiopathic fevers are primarily produced by a diseased state of the whole circulating current." (*Observations on the Healthy and Diseased Properties of the Blood*, p. 148. 1832.)

It is impossible to enter here into the facts and arguments by which these views have been supported. Let it suffice, that the humoral pathology has thus been for the first time placed on something like a substantial basis. Dr. Stevens's researches go to prove, that the fevers of the West Indies origin-

ate in a diseased state of the blood. Propositions so important, however, cannot be adopted without strong confirmation. This they have not yet received from his transatlantic brethren, though his book has been before the world upwards of six years; and, meanwhile, they cannot but be viewed with distrust in Europe, when it is found, that, contrary to his general inference, they will not apply to fevers universally, but are at variance with what is observed in the typhus of Great Britain. For the blood in British typhus presents no marked disease at the beginning; its saline matter, though it diminishes as the disease advances, does not decrease out of proportion to the other ingredients, more especially the colouring principle; and, in the worst cases, to the very last, nay even after death, the dark venous tint of the blood readily undergoes the usual change to arterial red under agitation with air, if that experiment be properly managed. But further, it certainly appears not a little extraordinary, that this theory should have been propounded in regard to the fevers of the West Indies, without actual experimental proof of the fundamental fact, a diminution, and disproportionately great diminution, of the saline materials of the blood. Nothing could have been easier to determine by analytic experiments; yet there is not a single analysis of febrile blood in the author's whole book, nor is it any where stated that such was ever made; and the loss of the salts of the blood is allowed to rest merely on inferential evidence or simple asseveration.

On the whole it may be strongly suspected, that, like many of his predecessors who are blamed by him for the same error, Dr. Stevens has mistaken effects for causes. That important changes occur in the blood in the course of fever was partly known before by vague observation of its sensible qualities, and is now fully substantiated by his researches, and the experimental inquiries of Dr. Reid Clanny. But the alterations which have been hitherto ascertained, have by no means been proved to precede the fever. They are distinct, at least, only after the disease has prevailed for some length of time; they certainly become greater and greater as it advances; and consequently the presumption is, that they are its effect, and not its cause. It seems highly probable, that a careful investigation of the state of the blood and secretions, among the other secondary phenomena, will lead to important reformations of opinion, as to many pathological details connected with fever. But the attempt to base a revival of the humoral pathology in its full force upon late chemical discoveries is premature, to say the least of it.

When the reputation of Solidism, and of the theory which refers fever to spasm of the capillaries was at its highest, a totally different doctrine was propounded by *Dr. Brown*, the countryman, and would-be rival, of Cullen. Dr. Brown supposed that all external agents possess the property of stimulating a power inherent in the animal body, which he termed excitability; that the result of their action, when natural in degree, is health; that inordinate excitement produces fever, by causing exhaustion of excitability, or what he called direct debility; and that defective excitement has a similar effect, by occasioning accumulated excitability, or, in his language, indirect debility. Although this hypothesis presented much of the plausibility and flightiness which are apt to mislead imaginative minds, it never gained over many advocates in Britain. In Italy, it was for some time current. But there, as here, it was found to lead to the pernicious practice of treating all fevers alike by stimulants; and the observation of the injurious effects of this practice in some epidemics gradually overturned the doctrines whence it emanated.

The present century had scarcely dawned, before the sentiments of physicians as to the nature of fever became so divided, that it is scarcely possible to say what were the prevailing principles of any of the great medical schools of Europe. It would require an undue extent of space to follow here the particular views which have been entertained by the chief authors, who have laboured in this branch of pathology during the last forty years. But it is necessary to take special notice of one doctrine, which forms, in various shapes,

the groundwork of the principles maintained by a considerable proportion of pathologists for twenty-five years past, as well as in the present day. This is the doctrine already adverted to, which denies the existence of any primary or essential fevers, and holds them all to be merely symptomatic of some local disorder. The opinions referrible to this head deserve careful attention, not less on account of the eminence of the men who have promulgated them, than because they are professedly founded, where alone sound views of the nature of diseases can be founded, in the investigations of pathological anatomy.

Early in the present century *Pinel*, the most acute and perspicuous of recent nosographists, while he advocated the doctrine of the essentiality of fevers, and carefully laid down the distinctions between those which are primary and those which are secondary to other disorders, nevertheless seems to have opened the door for the new theory, by assigning to each species of primary fever, admitted into his classification, a concomitant local disturbance. He held that inflammatory fever is connected with disturbance in the general circulating system, bilious fever with disorder in the digestive organs, a particular form of gastric fever with disease in the intestinal mucous follicles, nervous fever with derangement of the brain and nervous system, and typhoid fever with depression of the general vital powers — thus obviously, in some measure, localising the disease.

Under the extended inquiries of pathological anatomists it was soon ascertained, that the morbid appearances to be found in fever are far more numerous and important than had previously been supposed; and, in the experience of some inquirers, certain appearances were found, as they conceived, to occur so invariably, and to correspond so uniformly with symptoms of local disturbance from an early period of the fever, that they were induced to consider such pathological derangements to be connected with the febrile state as its real cause. In this way were formed, on the one hand, the doctrine of *Dr. Clutterbuck*, published in 1807, that fever is not a primary affection, but essentially a local inflammation, the seat of which is in the brain; and, on the other hand, the theory of *Broussais*, announced in 1816, who, denying equally the primary nature of fever, maintained that its local cause is irritation, or inflammation, of the gastro-intestinal mucous membrane.

The principles of Clutterbuck have met with few adherents among authors, and with still fewer proportionally among practitioners. But the hypothesis of Broussais, upheld by the enthusiasm and eloquence of its founder, and professing to rest on the irrefragable evidence of anatomical facts, quickly spread far and wide, especially among continental physicians. And although it is now confined within a much narrower range, it is still believed in by many, and may be truly regarded as the parent of several other forms, in which the doctrine of non-essentialism has been more recently offered to the profession, and in some quarters very generally espoused. Broussais — and in this respect his followers have shown themselves his apt and faithful pupils — took a summary view of gastro-intestinal derangement as the source of fever. For so long as he could find any trace of morbid alteration of structure in the stomach or intestines, no matter how slight or vague the appearances might be, he felt at no loss in ascribing the general disorder to a local cause. Others, however, have not been quite so easily satisfied. They believe that Broussais saw with the vision of a theorist; that he discovered structural changes invisible to other unprejudiced eyes; and that he frequently mistook, for true morbid appearances, the pseudo-morbid results of operations carried on in the body after death.

In the course of testing, however, the accuracy of his doctrine by the means to which it owed its origin, namely, by appealing to the condition of the organs of the body after death, it was remarked, especially in certain localities, and above all in France, that one particular form of fever, more frequent and more important perhaps than any other, often presented itself in connection with an undoubted and formidable local disorder of the intestinal canal, which consists of inflammation of the solitary and conglomerate glands of the intestinal mucous

membrane, leading on to ulceration. The existence of this disorder was indicated so early as 1762 by *Roederer* and *Wagler* of Göttingen in the course of an epidemic fever which prevailed in that city. It was again attentively observed in 1813 by *MM. Petit* and *Serres* at Paris. But its anatomical characters and exact seat were first determined by *M. Bretonneau* of Tours, who considered it a distinct disease, and termed it Dothinenteritis (δοθιὴν, a pimple, and ἔντερον, intestine). And the first who investigated the relations of the local diorder with fever was *M. Louis*, the eminent physician of the Hôtel Dieu at Paris. M. Louis has been led by his extensive and minute pathological inquiries to the conclusion, in which very many pathologists, both among his countrymen and elsewhere, coincide with him, that the typhoid form at least of fever is always owing to inflammation of the glands of the intestinal mucous membrane; that dothinenteritis is the necessary anatomical character of typhus.

Somewhat different from the doctrines of Broussais, as well as from those of Louis, yet based essentially on the tenets of the former physiologist, is the hypothesis of *Professor Bouillaud*. According to Bouillaud fever is nothing else than an affection symptomatic of irritation or general inflammation of the circulating system; inflammatory fever, one of the degrees only of this irritative or inflammatory state; and the other forms of supposed primary fever mere complications, arising sometimes from inflammation of the alimentary mucous membrane and its mucous follicles, sometimes from irritation of the cerebro-spinal system, and sometimes from the introduction of putrid substances into the blood. This strange hypothesis, much vaunted at present among the author's countrymen, and spoken of by himself with a degree of confidence which, with the exception of M. Louis, peculiarly characterises the writings of the whole modern sect of non-essentialists, is obviously derived fundamentally from the hypothesis of Broussais, and engrafted with the nosological classification of Pinel, as well as the doctrine of Frank respecting the origin of inflammatory fever in inflammation of the arterial system.

Such are the leading opinions which have been entertained of late years by those who deny the existence of primary fever in general, or the primary nature of some of its forms. There can be no question that the essentialists, who looked almost entirely to fever in the abstract, neglected too much the local affections which attend it, and to which so great importance has been attached by many in recent times. But it appears not less clear, that the non-essentialists have raised the importance of these local disorders too high, and have been led, by an excessive confidence in the visible indications of pathological anatomy, to underrate the importance of the general febrile state. There may be a doubt, whether all of the diseases, which have been considered as fever by the numerous inquirers into this question, are really primary affections. It may in particular be doubted, whether the disorder described by *Bretonneau* and *Louis* is not a local disorder which simulates fever. But at the same time it seems difficult for any one to survey dispassionately the whole facts, without coming to the conclusion, that fever is essentially a primary disease, and that most, nay possibly all, of the local diseases which have been pointed out as its real source are nothing else but secondary affections. From this conclusion it is doubtful, whether the dothinenteritis of Bretonneau may be excepted. The arguments by which the opinion here advanced may be supported are chiefly the following: —

In the *first place* examples of the three forms of continued fever — synocha, synochus, and typhus — occasionally present themselves without any appreciable sign of local inflammation during life, or any corresponding appearance after death. Non-essentialists deny this, and say that the signs and appearances in question are often obscure, and have merely been not well sought for. There is an end, however, of all argument with such controversialists. The symptoms and appearances of local disorder, assigned by the non-essentialists as the cause

of fever, are now well enough known to every scientific physician, and are frequently seen by every practical man who turns his attention to the pathology of fever, more especially in great hospitals. The argument advanced above is nevertheless still found to stand good; and the charge of wilful blindness may be met in the same strain by a charge of wilful delusion of sight. *Secondly*, the greatest proportion of cases of pure fever occurs in that form of it, where local inflammation would naturally be expected to be most frequent, that is, in synocha. *Thirdly*, the greatest proportion of cases of concomitant local inflammation occurs in the circumstances, where exposure to the causes of fever is most associated with exposure to the causes of local inflammation. Thus, instances of pure fever are proportionally much more frequent among the better ranks than among the working-classes; and that there may be no fallacy in this argument, from the possibility of the kind of fever being different, it may be added, for the sake of limiting the statement, that the fact is observed to hold remarkably in respect to medical pupils and practitioners, who take fever by infection while attending fever patients in hospitals and dispensaries, and where no doubt whatever can exist as to the identity of their disease with that prevalent among people of lower condition. Thus too, instances of pure fever are much more common among cases of relapse, than among first attacks; a circumstance quite unaccountable on any other principle, except that local inflammation is secondary to fever, and arises often from simultaneous exposure to the cause of fever, and to the causes of inflammation. *Fourthly*, in a great proportion of instances, where local inflammation does occur in fever, it is secondary in point of time. It does not occur till the fever is fully formed; at least signs of its presence cannot be detected for some time afterwards, and often not for a very long period. As a corollary from this fact it would follow, according to the doctrine of Essentialism, that local inflammations are least frequent where the fever runs a short course; and this is actually found to be the case. *Fifthly*, where signs of local inflammation do show themselves, they often abate and disappear, without the general fever being in the slightest degree subdued, or prevented from running its usual course, though that may be very long. *Sixthly*, on the contrary, the symptoms usually considered essential to primary fever may gradually disappear, and yet the local inflammation may continue with its peculiar signs, and come independently to one of its customary terminations. *Lastly*, local inflammation of every sort may occur during fever; and, nevertheless, the grand features of the febrile state are essentially the same. We perceive the signs of chronic or of acute inflammation developed in one or another of almost every important internal organ of the body; but still, in a genuine case of fever, no experienced physician can be at any difficulty to point out other symptoms common to all, and not necessarily connected with inflammation of any organ. The conclusion seems irresistible, that there is something else in the disease independent of the local disorder. The general fact here adverted to has been the evident source of much embarrassment to the non-essentialists, since they cannot agree among themselves, what is the precise local seat of the cause of fever, some assigning the brain as its seat, some the glands of the intestinal mucous membrane, some the mucous membrane itself of the whole gastro-intestinal canal, and some the general circulating system.

The statements of fact here made are consonant, it is apprehended, with the experience of every British physician, who has been practically conversant with the phenomena of continued fever, as they have been presented on the great scale in the hospitals of this country during the last twenty years, since the appearance of the great epidemic of 1817. At all events, nothing has been stated above which has not been verified again and again during that period, throughout the repeated epidemics which have prevailed in Edinburgh. The epidemics of fever, which have occurred in that city during the interval in question, have presented a very great variety of type or constitution, having gradually varied from the inflammatory form which characterised the earliest

epidemic, to the typhoid character which is at present (1838) dominant. The opportunities of observation may, therefore, be safely said to have been peculiarly favourable. The facts are as already given. The result, it may be added, has been, that not a single observer, who has enjoyed these opportunities throughout, is to be found in the ranks of the non-essentialists. It may be granted, that truth is not to be put down by authority, however consentaneous. Yet, nevertheless, a circumstance of this kind is not without its weight in the argument, more especially when it contrasts singularly with the result as to medical opinion in other great cities, such as Paris, where physicians have plainly formed their conclusions regarding the nature of fever in the abstract from observing the characters of a single form rarely presented in the epidemic shape.

The arguments thus adduced against the supposed dependence of fever on local disorders at large are equally applicable to each particular disorder, which has of late been pointed out by pathologists as its cause. They may be applied, for example, to the dothinenteritis of Bretonneau, the only cause, according to *M. Louis* and many others, of true typhoid fever. This local affection, though comparatively rare in Edinburgh, is well enough known to every practitioner of experience as an occasional accompaniment of typhoid fever, especially in times when there is an epidemic tendency to diarrhœa and dysentery. It has been recognised by the same symptoms during life, and ascertained by the identical appearances after death, which have deservedly attracted so much attention in the French capital. But it has proved invariably secondary in point of date: its appearance and disappearance in special cases have repeatedly been observed to exert no influence on the essential features of the general febrile state: it has been occasionally seen to continue, with its proper local signs, long after the general fever had come substantially to an end, sometimes in that case undergoing a cure like the fever before it, sometimes on the contrary proving fatal: it has been met with precisely in the circumstances in which cases of apparently pure fever were at the same time engendered, that is, in families suffering generally from typhus without any intestinal disease; in cases where, judging from the symptoms and morbid appearances it was entirely wanting, which cases have uniformly formed an overwhelming majority, the general fever has been precisely of the same character, and very often precisely the same in degree, as where the local disorder was present: and, in conclusion, the intestinal disease has repeatedly presented itself in groups;—the *constitutio dothinenterica*, to speak in nosographical language, has repeatedly appeared and disappeared as a subordinate or intercurrent epidemic in the course of the more general epidemic—typhus, without the great features of that epidemic being altered in any material respect.*

The errors of pathologists in investigating the question of the primary or secondary nature of fever seem to have mainly arisen from a circumstance, to which several other important errors that have lately gained currency are equally owing, namely, from limited observation, extensive enough perhaps in one sense, but limited in so far as it comprised experience of the phenomena of the disease in one locality only, and often too in one epidemic of that locality.

* The writer of this article feels equal delicacy in avoiding, as in making, allusion to the result of repeated conversations, which, in common with *Dr. Tweedie*, he had lately the pleasure of enjoying with *M. Louis*, the most formidable adversary that the doctrine of the primary nature of typhus has yet encountered. But, on the whole, he thinks it best to state as his impression,—without the most distant intention however of holding M. Louis pledged to the statement,—that the views of that eminent and most candid pathologist have undergone some change since the publication of his last writings on the subject of fever; that, while he still holds the intestinal affection to be the anatomical character of true typhus, a local disorder essential to his *vraie affection typhoïde*, he admits that in London and Edinburgh we have a totally different disease, which is closely similar as to the character of the general fever. British pathologists will, it is apprehended, insist generally on larger concessions, and will maintain that this different disease is nothing else than the primary disease, or true typhus, and the other a secondary or intercurrent affection.

The fate of preceding theorists holds out small encouragement to any author of the present day to embody his own views of the general doctrine of fever. But some statement of the kind is nevertheless necessary for imparting a thorough idea of the spirit in which he communicates details, because no man perhaps ever wrote or practised in fever, without being more or less guided by one doctrine or another. The theory of fever then, which seems most consonant with the whole facts, with the general sentiments of the Profession, especially in Britain, and with a sound and prudent practice, is probably the following. — Fever is an essential or primary disease. The first appreciable event in the chain of sequences constituting fever is a functional injury of the nervous system. The only essential or invariable consequence of this affection is functional derangement of most of the important organs of the body, but more especially of the brain, the circulating organs and fluid, the alimentary canal, and the skin. The characters of fever vary in some measure from year to year, and in different places, owing to unknown causes, which, for convenience, have been included under the generic term "epidemic constitution." The variations in its character, constituting varieties of primary type, probably depend on differences in degree in the primary functional derangement of the nervous system. Other variations, consisting in the undue development of special local disorders, whether functional merely, or passing into the organic character, or truly organic, depend partly on epidemic constitution, partly on manifest concurring causes acting at the moment of invasion of fever, or in its course. The changes which have hitherto been observed to take place in the blood and other animal fluids are, like the local disorders, secondary and not primary: they may be the source of the phenomena remarked in the advanced stage of the disease, but they are not the source of the disease itself in the first instance. The preceding principles are, in correct philosophical language, matters of *theory*, capable of being decided by facts so soon as pathologists are agreed respecting the facts. If we wish to advance a step farther, and tread in the regions of *hypothesis*, then it seems a reasonable doctrine, that the primary disturbance of the functions of the nervous system acts first on the capillaries or extreme vessels of the surface, as well as throughout the internal organs, and produces, not spasm as was imagined by *Hoffman* and *Cullen*, but rather, according to modern views of the state of the capillaries in inflammation, a state of atony, relaxation, and distension, and consequently obstruction to the passage of the blood; that the disturbed state of the circulation is an effort excited by the stimulus of this obstruction for accomplishing its own removal; and that the disturbance of the function of circulation is variously modified by the constant coexistence and direct influence of the disturbance of the nervous functions. At all events there seems no question, that there are always two leading phenomena in fever, howsoever induced — disturbance of the nervous system and disturbance of the circulation; that, howsoever connected originally in the chain of sequences, they act and react on one another; and that their coexistence and reciprocal action, while they account on the one hand for many subordinate phenomena which are otherwise unintelligible, must on the other be kept constantly in view as modifying singularly the effects of remedies, and therefore regulating in many essential respects the method of cure.

Exanthematous or Eruptive Fevers. Modern nosologists restrict exanthematous fevers to certain febrile diseases accompanied with efflorescence of the skin, (comprehending small-pox, measles, and scarlet fever,) and allied to each other in the following circumstances: — 1. Though the eruption is of a defined character, it is preceded by a characteristic group of febrile symptoms, the fever pursues a definite course, and the exanthema passes through a regular series of changes. 2. They occur only once (with very few exceptions) during life. 3. Almost all mankind are susceptible of them. 4. They are propagated by a specific contagion.

1. The defined character of the eruption, the remarkable combination of

symptoms which attends the eruption, and the precision with which the several changes or phases of each disorder occur, are most remarkable. The eruption of small-pox appears on the third day from the commencement of febrile commotion, and maturates or culminates on the tenth. In measles the fever rages in the system for four days before its specific eruption is developed, and three days suffice for the completion of its course. The efflorescence of scarlatina is perceptible on the second day, and begins to disappear on the fifth from the first occurrence of rigor or sickness. The course of the fever and the series of changes which the eruption undergoes are alike fixed and uniform, being in all important points uninfluenced by age, climate, season, or habit of body, and admitting only certain modifications from causes altogether unknown or imperfectly understood.

2. The second common character of the true exanthemata is founded on the law of non-recurrence. Immunity from second attacks of the same malady is a very remarkable principle in pathology. Mankind have by common consent attributed the power of conferring immunity from second attacks to three only of the many diseases to which we are liable, — viz. to small-pox, measles, and hooping-cough. It constitutes undoubtedly a most important feature in the medical history of these disorders, and by virtue of it they are, to a certain extent, isolated from other maladies. The same property belongs, though in unequal degrees, to three other forms of febrile disease, — viz. to yellow fever, to the plague, and to scarlet fever. It is more striking in yellow fever than in plague; more observable in the plague than in scarlet fever; but in all, the susceptibility to future attacks is either greatly lessened, or entirely removed, by once undergoing the disease. The doctrine of immunity from second attacks, though generally predicable of small-pox and measles, is, even in those diseases, liable to certain exceptions, as will be more fully explained afterwards.

3. Universal susceptibility is the third character of the exanthemata. The exceptions to this law, in the instances of small-pox and measles, are very few, and there is great reason to believe, that in many of these excepted cases, the inaptitude to receive the disease arises from temporary causes, and ceases in the course of a few months, or possibly not until after the lapse of years. The principle is not of such general application in the case of scarlatina.

4. The exanthematous fevers are propagated by contagion. The power of producing a contagious matter is one of the most striking characters of small-pox, and in the phenomena of inoculation we possess the most convincing proof of the truth of the principle. The evidence in favour of the possibility of inoculating, or rather of artificially exciting, the measles is strong, though still open to some objections. The instances of the spreading of scarlet fever by personal intercourse are so numerous and unequivocal, that no enlightened pathologist of the present day hesitates to acknowledge the fact. Some contagions develop themselves quickly, such as those of scarlet fever and plague, which generally require from four to six days for their incubation; sometimes, however, more especially in scarlet fever, the period has been longer deferred. Others as small-pox and measles, require nearly a fortnight for their perfect development. Some contagions, however, remain latent in the constitution for three, four, or six weeks, but each of these respective periods is subject to certain modifications, which will hereafter become objects of special investigation.

Classification of Fevers. According to the exposition formerly given, Fevers, in the most comprehensive sense of the term, may be divided into primary fevers, irritative fevers, eruptive fevers, and febrile or acute inflammations. Primary fevers may be subdivided into continued, intermittent, and remittent fevers; to the last of which may be attached, as an appendix, yellow fever, until more precise information be obtained regarding its source and nature. Of continued fever it is sufficient to indicate three varieties or types — synocha, synochus, and typhus; — which may all occur either

simple, or with complications. Irritative fevers are a less accurately defined class than any other, as they pass by insensible shades into remittent or continued fever on the one hand, and into the febrile inflammations on the other. But it may be convenient to arrange under this head gastric fever, gastro-intestinal remittent, and also hectic fever; the last of which, though commonly, is by no means necessarily, associated with suppuration, and may be correctly considered as a fever from irritation. The arrangement will therefore stand thus: —

PRIMARY FEVERS: —

Continued Fever, —
Synocha, or Inflammatory Fever.
Synochus, or Mixed Fever, Nervous Fever.
Typhus, or Adynamic Fever.

Intermittent Fever, —
Tertian.
Quotidian.
Quartan.

Remittent Fever, —
Marsh-remittent, comprising probably
Yellow Fever.

IRRITATIVE FEVERS: —
Gastric Fever, and *Gastro-intestinal Remittent.*
Hectic Fever.

ERUPTIVE FEVERS: —
Small-pox.
Measles.
Scarlet Fever.

CONTINUED FEVER.

Symptoms of continued fever. — Secondary affections. — Affections of the head — of the throat — of the chest — of the abdomen — of the skin. — Sequelæ. — Relapse. — Partial rheumatism and neuralgia. — Partial palsy. — Œdema. — Acute febrile inflammations. — Supervention of phthisis pulmonalis. — Mania. — Prevalence, duration, and mortality. — Anatomical characters. — Causes — Prognosis. — Treatment. — Prophylaxis.

CONTINUED FEVER may be defined nearly in the same terms with those formerly employed in the definition of fevers generally. It is *a disease in which, after a precursory stage of languor, weakness, and defective appetite, acceleration of the pulse takes place, with increased heat, great debility of the limbs, and disturbance of most of the functions, without primary local disorder, and without well-marked remissions.* It has been already stated above, that none of these characters is absolutely invariable. Thus the appetite is occasionally not at first affected; the strength is at times so little reduced in the early days, that a man in the incipient stage has been known to walk forty-five miles within as many hours; the pulse not unfrequently does not rise beyond seventy; the heat is often immaterially increased; the debility of the advanced stage may disappear for a time in connection with active delirium; local inflammations

frequently concur with the general fever, especially when fully formed; and very distinct remissions are often enough observed towards the commencement, and sometimes throughout the whole course, of the fever. The least invariable character is disturbance of the functions generally; for it seldom happens that the functions of the digestive organs and of the skin are not essentially deranged, and the clearness and precision of the external senses impaired.

Symptoms of Continued Fever. There is but one way of taking a comprehensive and simple view of the symptomatology of continued fever; which is, by considering first the essential phenomena of its three leading varieties or types, and then the phenomena which are incidental or accessory. It seems advisable too, that the symptoms of the three types be viewed in succession or close relation to each other; because they are, at least in the opinion and according to the experience of the writer, mere varieties of one fundamental disease, originating in the same causes, and constituted merely by differences in those obscure cooperating influences which are alluded to when we speak of Epidemic Constitution. This is the conclusion to which every one will arrive, who has had an opportunity of closely watching in hospital practice a long series of epidemics, similar to those which have ravaged the city of Edinburgh between the years 1817 and the present time. For the disease has been clearly seen, during that interval, to pass very gradually from a type in which pure inflammatory fever was exceedingly common, first into one composed of the same fever in the early stage, and of adynamic fever in the advanced stage, and at length into a type of nearly pure adynamia or typhus, which has prevailed for a few years past. And these changes have thus gradually taken place, without any other essential alteration in the history of the disease, but especially without any change in its apparent mode of propagation and causes.

Symptoms of Synocha. It has become fashionable of late with medical authors to doubt or deny the existence of such a fever as synocha or inflammatory fever, or at least to limit it to warm climates, and to admit ephemeral fever alone as an exemplification of it in temperate countries. But this is a mistake, arising simply from limited opportunities of observation, and the disregard of epidemic differences occurring in different years and different places. In the Edinburgh epidemic of 1817-20, a fever purely inflammatory, or with complications, but altogether divested of the typhoid character, was so prevalent, that from a numerical statement kept for some time by the writer, it formed between a fifth and a sixth of the patients in the Infirmary and Fever Hospital. In the subsequent epidemic of 1826-9 the same form was observed, but by no means in so great a proportion; and since then it has gradually disappeared, and is now scarcely ever met with. There is no room, therefore, for the doubts which have been lately thrown over the accuracy of Dr. Cullen's classification and delineation of fevers, from the apparent impossibility of finding his synocha or inflammatory fever. In this, as in other respects, Cullen's delineations are true to nature, whatever may be thought of his speculations in regard to the proximate cause or essence of fever; and, indeed, little has been hitherto done to improve the leading features of his classification, and least of all by those who have slighted his admirable descriptions of disease.

Synocha may be defined nearly in the language of Cullen, *a fever, consisting of a stage of chilliness or rigor, succeeded by great increase of heat, frequent hard pulse, redness of the urine, little disturbance of the mental faculties, and tending in general to terminate by sweating.*

It commences for the most part abruptly. The patient is suddenly seized with an undefinable sense of feebleness, languor, and oppression, disinclination for food, sickness and perhaps also vomiting, frequency and feebleness of the pulse, — followed speedily by pain in the back, headach, a peculiar sense of weight or rending in the limbs, coldness in the back, general chilliness, and often absolute shivering, with paleness of the features, and the *cutis anserina.*

When these symptoms have lasted for a period varying in general from one hour to half a day, the coldness passes off; the pulse, from being soft and fluctuating, becomes hard, sometimes full and bounding, often small, wiry, and incompressible, generally very rapid, sometimes so frequent as 140, 150, or even 160; the tongue dry and covered with white or yellowish fur; the skin parched, red, hot, often pungently so; the animal temperature elevated to 102°, 104°, and occasionally so high as 107°. At the same time there is increased headach, with giddiness, throbbing of the temples, and flushing of the features; great undefinable uneasiness in the limbs, occasioning frequent change of posture; an intense sensation of heat; whiteness and dryness of the tongue, with urgent thirst and desire for cold liquids, but a total loss of appetite; constipation; redness and scantiness of the urine, often with a tendency to discharge it frequently; extreme irritability of the senses of sight and hearing, more especially remarked in the irritable constitutions of persons in the better ranks, so that in them the faintest light, and any regularly recurring sound are insupportable. An exacerbation commonly occurs in the evening or early part of the night, and a remission early in the forenoon, but the difference is frequently trifling. The fever is thus fully formed in general in the course of the first evening; but not unfrequently the hot stage is completely developed in an hour or less; and, on the other hand, it may be imperfectly presented till the second day. There is not necessarily any local pain, except headach and a sense of soreness or rending of the back and limbs. Vomiting and sickness are seldom present, or at least troublesome, till the second or third day; are often wanting throughout most of the attack; and frequently are insignificant till bloodletting has been practised, after which vomiting is often frequent and severe. The faculties of the mind are for some days unaffected, except by restlessness and anxiety, and they may continue undisturbed even during the whole course of the fever; but frequently after a few days there is a tendency to delirium, and at times the delirium is active, and indicated by frequent incoherent talking, together with a disposition to roam. Very often, however, the tendency of the patient to leave his bed, from mere febrile restlessness and desire of change of posture, is mistaken for delirium. Delirium occurs most frequently for a short time before the hot stage of the fever is about to be resolved. The blood from a vein is commonly very florid,—sometimes, in young adults with high reaction, so unusually bright, that the surgeon is apt to imagine he has opened an artery instead of a vein. It coagulates in general firmly, with little separation of serum; but not unfrequently shows the buffy coat, contracted clot, and distinct separation of serum observed in acute local inflammations. The terminations of this form of fever are essentially three in number, abrupt departure in connection with some critical discharge, gradual mitigation and disappearance, without particular increase of any of the excretions or any adventitious evacuation, and gradual transition from the purely inflammatory character into the typhoid type. But when the last of these courses is pursued, the disease ceases to be synocha, and is characterised as synochus. A common course is gradual mitigation of the symptoms between the seventh and fourteenth days, sometimes without any critical discharge, yet sometimes too in concurrence with occasional attacks of sweating. If the fever lasts, however, much longer than seven days, it commonly puts on, sooner or later, the typhoid or adynamic character. If, on the contrary, there is decided amelioration earlier than the seventh, or even on the seventh day itself, the amendment usually becomes complete, and occurs in connection, either with a profuse attack of sweating, or sometimes, though far more rarely, with an attack of diarrhœa or of epistaxis. The most frequent, and by much the most remarkable, variety of this type of fever, is that which terminates abruptly by sweating. Sometimes so early as the fourth day, very rarely earlier; most generally on the fifth or sixth, sometimes on the seventh or eighth, but seldom at a later period, the skin becomes moist, along with sudden abatement of the headach and jactitation; and a profuse discharge of sweat follows, which lasts for two, three, four, six hours, or upwards, and

leaves the patient languid and exhausted, but otherwise almost free of every complaint, and, in particular, with the pulse at the natural standard. It is not uncommon to observe a sweat of four hours change the condition of a patient from all the tortures of an ardent fever, with the pulse at 140, to a state of complete repose and absence of all suffering except from extreme languor, with the pulse at 70. In a few rare cases the fever is carried off in like manner by critical diarrhœa or critical epistaxis. Convalescence from an attack of fever of this kind is always slow, several weeks being requisite for restoration of the strength, even where the patient has not been more than five or six days under the proper febrile symptoms. Relapse too is common, and it usually takes place about the fourteenth day; nor does any care on the part of the patient to avoid the causes of excitement or fatigue seem to have any tendency to diminish the chance of relapse. This commences, for the most part, with severe shivering; symptoms succeed similar to those already mentioned as characterising the primary attack; and the disease is finally resolved by another fit of profuse perspiration, generally in the course of the third day from the reappearance of rigors.

Such is a sketch of inflammatory fever in its pure state, as it occurred in a considerable proportion of cases of epidemic fever, especially among young adults, both in Edinburgh and in other parts of Great Britain and Ireland, between the years 1817-20, and likewise, though to a less extent, in the succeeding epidemic of 1826-9. In many instances, however, the disease was not altogether pure. More generally it was attended, in one part or another of its course, with symptoms of local inflammation,—most frequently in the chest, occasionally in the peritoneum, more rarely in the larynx, often in the tonsils, seldom in the parotid gland, and very seldom in the head. Such local affections, of which catarrh, pneumonia, and pleurisy, were the most common, did not show themselves till the fever had lasted for a few days; they frequently disappeared some time before the cessation of the febrile symptoms; and they were, for the most part, very easily removed by general or even local depletion. In a few rare cases the local inflammation went on where the fever was checked. Rheumatic attacks were common during convalescence; but they were seldom attended with any febrile disturbance of the circulation. Cases of pure fever were most frequent in young persons of the better ranks, who were not exposed to the ordinary cooperating causes of local inflammation.

The synocha of hot climates seems not to differ essentially from the disease here described. The tendency to diaphoretic crisis, however, is less marked; there is not the same frequency of relapse; neither is it observed that relapse is apt to occur after a fixed interval, rather than at other irregular periods of convalescence. It is also said by *Dr. Stevens*, that it is never ushered in by rigors, and that the blood, though always unusually florid, never presents the buffy coat of inflammation. Farther, while the inflammatory fever of hot climates evidently arises from atmospherical vicissitudes, or such other causes, and independently of communication with the sick, the synocha which is described above often originates as unequivocally in infection, as will be more fully explained under the head of the *Causes of Fever*.

Under the general denomination of synocha may be arranged the slightest of all febrile disorders of the primary kind — *ephemera*, or ephemeral fever, so named, because it seldom lasts much longer than a single diurnal revolution. This is the simplest of all febrile affections. Its characters have been already described and nothing farther need here be said on the subject. It is undoubtedly in general a primary affection, and often no apparent cause can be discovered for it. Frequently it originates under atmospherical vicissitudes during the irregular months of spring in these climates; frequently too, during the prevalence of ordinary epidemic synocha, it seems to arise as if from an effort of the epidemic cause to invade a constitution seasoned by a previous attack; occasionally it is seen as the apparent effect of large doses of cubeb-

pepper, given continuously as a remedy for gonorrhœa; but, most frequently of all, it is exceedingly difficult to discover any unequivocal cause for it.

Synocha may pass by insensible shades, first, into synochus; secondly, into gastric or gastro-intestinal fever; and, thirdly, into the acute or febrile inflammations. It is seldom difficult to distinguish idiopathic local inflammations from primary inflammatory fever; yet sometimes the diagnosis is obscure. The chief distinctions are, that in the latter the local inflammation is slight compared with the general febrile state; that it arises consecutively to the fever, and may cease without the latter disappearing or even abating; and that there is throughout the disease, but especially at the beginning, more oppression, nervous exhaustion, and restlessness, together with a peculiar expression of the countenance, which a practised person may for the most part readily recognise. Gastric fever is sometimes distinguished from synocha with great difficulty. The pyrexia, however, is seldom so violent, nor the countenance so oppressed, nor the sense of rending and restlessness of the limbs so distressing; neither is there so marked a tendency to resolution of the disease by sweating; while, on the other hand, the tongue is more loaded with yellow sordes, or red and raw-looking,—the local symptoms referrible to the abdomen are generally more marked, though this is far from being invariably the fact,—and there is usually a much more distinct tendency in the fever to put on the remittent type. There is never any difficulty in distinguishing true inflammatory fever from synochus; but the former passes insensibly into the latter, by the supervention of typhoid symptoms towards the commencement or termination of the second week; and, according to the degree of that secondary stage, the case may be regarded as belonging either to one type or the other.

Symptoms of Synochus. This is probably the most frequent of all types and forms of continued fever. It is essentially characterised by the disease commencing as synocha and terminating as typhus. There are scarcely any cases of primary continued fever, which do not present an inflammatory stage of longer or shorter duration, and of more or less violence at the commencement; so that, perhaps, all continued fevers not falling under the purely inflammatory type, might be considered as synochus. But in nosological arrangements, as well as in practice, the term is usually, and in reference to treatment conveniently, restricted to such primary fevers as begin with a distinctly-marked inflammatory stage like synocha, lasting for at least a few days, and not giving way to adynamic or typhoid symptoms till the beginning of the second week at soonest. Such was the general nature of the epidemic fever which raged in the United Kingdom from 1817 till six or eight years ago; and such too seems to have been the *febris bellica* of the Continent, which broke out in the large towns of Germany and other continental countries of Europe in 1814, subsequently to the French war; and of which, indeed, the British epidemic was probably a propagation. Under the same head may be classed most of the fevers described by English authors of the last century, under the name of nervous fever. The most remarkable examples of it which have perhaps been ever seen, occurred in the British epidemics of 1817-20 and 1826-9. For the inflammatory stage was often so well-marked, that it was impossible to tell for some days whether the disease was to terminate as synocha, or pass on to the typhoid stage of synochus; while, on the other hand, the typhoid characters of the advanced stage were often in those very cases so well-developed, that no one, seeing the disease for the first time at this period, would have known from the symptoms that it had ever been any thing else than true typhus. In later years the inflammatory stage has become much less prominent; and in the generality of cases, at least in Edinburgh, as well as in other great towns, it has at present almost disappeared, and given place to typhoid symptoms from a very early period of attack.

In describing synochus it seems unnecessary to enter into particulars. The details of the typhoid stage are exactly the same with those which will pre-

sently be given under the head of typhus. Those of the inflammatory stage have been already related at sufficient length under that of synocha. In synochus, as in synocha, the fever is sometimes simple, but much more frequently complicated, as in the latter, with local inflammation in the early stage. Later in the disease, when typhoid symptoms are formed, local inflammations and local congestions frequently appear as in typhus, and more frequently than these secondary disorders are observed to show themselves in the early stage. Yet, even in the latter stage secondary affections are sometimes absent, so that we have a pure, uncomplicated, primary synochus from first to last. Cases of this nature were clearly observed during the British epidemics above referred to. The most common secondary affections in this, as in the inflammatory form of continued fever are, in Britain at all events, inflammatory diseases of the lungs — pleurisy, pneumonia, but especially catarrh, often passing into bronchitis.

The passage of synocha into typhus usually takes place, as already remarked, in the course of the second week. It is indicated by the pulse opening up as it were, becoming fuller, more compressible, though still often equally jarring, and falling at the same time somewhat in frequency. The tongue also acquires a brown dry streak down the centre; the heat is less pungent, while the skin is equally dry; but, in particular, the muscular exhaustion increases greatly; the senses from being irritable become more obtuse than natural, especially the sight and hearing; the integuments, from presenting a bright red flush, acquire a dingy reddish-brown tint, of the nature of congestive redness; and there is a marked tendency to doze, sometimes intermingled with slight muttering delirium. These changes gradually lead on to the state of true typhus in its characteristic form, which will now be described.

Symptoms of Typhus. As synocha passes by insensible shades into synochus, so the latter passes insensibly into *typhus.* The early stage of inflammatory symptoms may be observed in different cases to be shorter and shorter in duration, and more and more intermingled with nervous depression or adynamia, till at length we have a fever, in which the inflammatory reaction is never characteristic, and is followed at an early period even of the second week by the same phenomena which constitute the latter stage of synochus.

The term typhus has gradually acquired of late a rather vague signification. In consequence of passing into unprofessional language, it has come gradually to signify, in familiar speech, *infectious fever;* and in this signification it is used even by many physicians. In correct nosographical language it should comprehend only those fevers where the characters of adynamia, or nervous depression, present themselves as the predominant feature of the disease from first to last. But in practice the term has been extended from this very restricted meaning, so as to embrace that far more numerous class of cases where such characters show themselves before the close of the first week, and where the earlier stage of pure inflammatory action, although present, is not well-marked. In this sense typhus is scarcely less important than synochus in point of frequency. In many epidemics it is the ruling form; and, for a few years past, in Britain generally, and especially in Edinburgh, it has constituted almost the sole prevailing type.

Typhus may be defined, *a fever characterised by a compressible, rather frequent pulse, little increase of the animal temperature, extreme languor and debility, and much disturbance of the mental functions.* Some, following the example of Cullen, indicate as another character its origin in infection; which however is by no means peculiar to this alone among continued fevers; neither is there a certainty, that it is an invariable character even of typhus. The most remarkable circumstances in typhus are the great exhaustion of the muscular strength, and the torpor of the mental functions, often mingled with delirium. The latter character is undoubtedly the foundation of its name, which is derived from τύφος, stupor.

Under this definition, and therefore under the specific name of typhus, may

be arranged a very great variety of epidemic fevers, which have been variously denominated, by the writers of the last century especially, low fever, low nervous fever, jail fever, camp fever, hospital fever, malignant fever, and the like. These will be all found, on referring to the descriptions of authors, to arrange themselves under the head of fever marked by the predominance of nervous exhaustion, as shown by feebleness of the pulse, prostration of the strength, and torpor of the functions of the mind.

It has been seen above that inflammatory fever in general commences abruptly; and such also is the case with characteristic instances of synochus, where the inflammatory type and stage are well-marked. Typhus on the contrary, and in common with it those cases of synochus which approach the typhoid form, in general begin gradually. Epidemics indeed have been described, where the patient is at once struck down by typhoid prostration; and in all epidemics instances of the kind occasionally present themselves to the physician's notice. But much more generally the disease begins with slight languor, trivial headach, disturbed sleep, deficient appetite, and inaptitude for mental or bodily exertion. In a day or two, or sometimes after an interval of several days, an attack of chilliness or rigor first convinces the patient that a serious illness is impending, and ushers in the unequivocal symptoms of fever. The pulse is now rather frequent, ranging between 90 and 100, seldom higher except in the young or in irritable habits, occasionally natural, or even under the healthy standard; and it is generally full, sometimes however small, commonly jarring at the extremity of its expansion, and always easily compressible. The tongue is white, often with red points from enlargement of the papillæ; and this state is attended with complete loss of appetite, as well as urgent thirst. The strength is greatly reduced, and there is a peculiar sense of exhaustion, felt even while the patient is in bed and at rest. The breathing is somewhat accelerated, short, with occasional sighing. The skin is rather hot, but seldom in such a degree as to occasion the desire for cold air, or to affect decidedly the hand of the physician. The bowels are commonly constipated; the urine not high-coloured, or loaded on cooling with sediment; the breath fetid, and in some measure peculiar; the cutaneous secretion either unaffected, or at times assuming the form of irregular sweats, partial, of short duration, and unattended with any abatement of the fever. The countenance is generally dingy, flushed, languid, and oppressed; the eyes somewhat injected, watery, and heavy, with unsteadiness of vision, but seldom much intolerance of light; the whole expression peculiar, so that by it alone an experienced physician may commonly recognise the disease. There is almost always more or less headach, though it is often very trivial; also commonly ringing or buzzing in the ears, with an undefinable sense of obscurity or distance of sounds, unconnected however with deafness; the ideas are confused, and the patient complains much of giddiness when he sits or stands. General pains, especially in the back, and febrile weariness and restlessness, though often present, are seldom so distressing as in synocha, and the early stages of synochus. Sleep is disturbed, and the patient imagines he gets none. Sickness is frequent, also vomiting, and still more a sense of fullness in the epigastrium; yet these symptoms are far from invariable, as some pretend.

In the generality of cases the symptoms here described continue with little variation, except in degree, till towards the close of the first, or more frequently the beginning, of the second week. In a few little change takes place even then, except that some degree of stupor is observed, in connection with dryness and brownness of the tongue, listlessness, unwillingness to be disturbed, and progressive anæmia; and recovery commences in eleven, fourteen, or seventeen days. In others, on the contrary, the characters of aggravated typhus form even about the middle of the first week; but such cases are rare. Most generally at the beginning of the second, or close of the first week, the tongue becomes brown, dry, often chapped, and the teeth covered with dark sordes; the pulse is either more soft, or more jarring, yet compressible, and

usually about 100 in frequency; the skin continues dry and not particularly hot, becomes often rough, harsh, and dingy, and frequently presents eruptions, which will be described under the head of the secondary affections; the evacuations are dark and fetid; the heat of the surface is little increased, but irregularly distributed, especially in the extremities, which are apt to become cold; the temperature is seldom much above the natural standard, often below, and occasionally, it is said, so low as 92° F.; there is little complaint except of weakness and want of sleep; sickness and vomiting, if previously present, disappear; the eyes are more suffused and heavy, the complexion darker and less flushed, and the expression that of disturbed oppressive sleep. The muscular debility and sense of exhaustion are very great, sometimes excessive, and accompanied at times with a tendency to fainting; and in a few cases the disease is brought to an abrupt termination by fatal syncope induced towards the end, or even sometimes the beginning of the second week, by some imprudent effort of the patient to sit up in bed, or rise to stool. There is also commonly wandering of the mind, marked by slight incoherent muttering and occasional incorrect answers, sometimes by more active delirium and constant incoherent rambling, and at times by loud talking and tendency to roam about. In some the tendency to get out of bed and wander up and down is inveterate, so that constant attention is required to prevent accidents. It is generally observed that the symptoms undergo an exacerbation during the evening and early part of the night, and a remission in the morning and early part of the forenoon. The double exacerbation, conceived by some to occur at midday as well as midnight, is either imaginary and founded on preconceived theory, or must be presented only in special epidemics, and has been rarely witnessed for many years past.

As the disease advances the pulse becomes more feeble, the tongue darker, more dry, and often retracted, the complexion more dingy, the prostration excessive and often attended with tremor of the hands and starting of the tendons at the wrists, the stupor deeper and less interrupted by delirium, the evacuations involuntary, or the fæcal discharges involuntary, with retention of urine and distension of the bladder. Where the event is unfavourable, death is preceded for one or two days by increased frequency and a jarring state of the pulse, hurried interrupted breathing, Hippocratic expression of the countenance, much injection of the conjunctivæ, increased subsultus of the tendons, twitches of the muscles of the face, singultus, and deep coma. Where on the contrary recovery is to take place, the tongue becomes moist and cleaner on the edge, the pulse more full and less jarring, the delirium milder and more broken by natural sleep, the stupor less profound, so that the patient is more easily roused, the expression that of drowsiness rather than of oppression; and frequently these favourable signs are attended with increased sensibility to the natural appetites, so that drink is asked for, and sometimes food also. These changes are very generally followed by progressive amelioration; which however is always gradual and slow.

The blood in typhus puts on a different appearance from what is observed in synocha. It is not bright, but on the contrary very dark, flows sluggishly from the vein, coagulates loosely, and seldom shows any appearance of a buffy coat. These characters become more and more marked as the disease advances; and in the later stages of bad cases the blood coagulates so loosely, as to be tremulous, brittle, and almost to resemble ill-made currant-jelly. It also alters materially its chemical constitution, becoming much poorer in all its solid contents, but especially in colouring matter and saline materials. The analytic researches of *Dr. Clanny* show that the salts and hæmatosin are often reduced to two thirds of the healthy proportion.

Fatal cases, where not resulting from sudden syncope early in the disease, most generally terminate between the eleventh and seventeenth days, very seldom sooner, and not often later, except through the intervention of secondary diseases. Amendment, or what is usually termed the "turn," or crisis of typhus,

also commonly occurs between the eleventh and seventeenth days, most generally about the fourteenth. But sometimes the disease goes on much longer, and with very little alteration in the nature or degree of the symptoms; and instances at times occur of mild typhus continuing unabated for six weeks. Authors have described a variety of phenomena which may present themselves at the time of crisis, and which appear to be connected somehow with the favourable change, such as spontaneous diarrhœa, bleeding from the nose, a profuse discharge of highly loaded urine, and above all perspiration. There is no question, that such "critical evacuations" do at times occur in typhus. But their frequency has been much overrated. Probably here, as in many other respects, important differences present themselves in different epidemics; and of late, assuredly, it has been rare that any increased natural discharge, or any preternatural evacuation, has been observed to accompany the crisis of fever.

Favourable cases show a decided tendency to terminate upon what are called critical days. This fact has been generally denied in modern times; but close observation has shown that the ancient physicians were correct in admitting the doctrine of critical days. Such is the result of the only extended series of observations recently made, those of Dr. Welsh in the Edinburgh epidemic of 1819. The critical days are 3. 5. 7. 9. 11. 14. 17. 20.; the non-critical are the intermediate days; but 4. and 6. are considered secondarily critical. The following table, constructed from 630 cases, where the commencement and termination of fever could be fixed with tolerable precision, certainly presents a remarkable correspondence with the ancient doctrine.

Days.			Days.		
Crit.	Non-crit.	Cases.	Crit.	Non-crit.	Cases.
3	- -	6	14	- -	63
4*	4*	18		15	10
5	- -	80		16	11
6*	6*	34	17	- -	34
7	- -	129		18	2
	8	26		19	4
9	- -	80	20	- -	0
	10	17		21	15
11	- -	69		22	3
	12	80		23	0
	13	15			

Hence of 690 cases, crisis took place in 470 on critical days, in 52 on the subsidiary critical days, and in only 108 on the days which are considered non-critical. It must be observed that these data are founded on cases of the three types of fever taken promiscuously, and at a time when synocha and synochus were common.

Secondary Affections in Continued Fever. Such are the symptoms, more or less essential, of the three great forms of primary continued fever. They are subject to great variety, owing to the various degrees in which the inflammatory and typhoid characters are combined. But they are also subject to still greater variations from the concurrence of secondary affections. It is in fact rare to observe a case of fever, whether typhoid or inflammatory, but more especially the former, run through its entire course without some incidental or secondary disorder making its appearance. Cases of pure unmixed primary fever do occur quite often enough, as formerly stated, to satisfy every attentive observer that such a thing as primary fever has real existence; but still cases of complication are infinitely more common; and they are proportionally most common where the fever lasts for some time, and where a disposition is manifested towards the typhoid form. They are proved to be secondary, and not

essential to the fever, because they present a great variety in their seat and nature; because they are sometimes all absent; because they very seldom make their appearance till the fever has subsisted for several days; and because they both appear and disappear without the course of the fever being thereby materially altered in any essential symptom. They seem to depend for their origin on certain local infirmities of constitution, or on the body having been exposed to some of the ordinary causes of local disorders about the period of invasion of the fever; and the direct pathological state which induces them is, in all probability, congestion of vessels in the part attacked—a state which exists more or less throughout the internal organs generally, and which is developed by co-operating influences into more positive local disease. In very many cases, however, it is impossible to point out satisfactorily the co-operating cause; and for the most part, much is left to be ascribed to obscure peculiarities of season, terrestrial locality, or epidemic constitution. These peculiarities are in some circumstances observed to be so comprehensive in their operation, as to impart a peculiar character to an entire epidemic of fever. And from such occurrences it is,—from certain local disorders occurring with great frequency on certain times and in certain places,—that many physicians have been impressed with the notion that the fever was not primary in its nature, but in reality secondary to the local affection.

There is scarcely any end to the number of local disorders which may occur incidentally during fever. Most of them partake of the nature of local inflammation. The secondary symptoms to which they give rise may be conveniently arranged according as the seat of disease is in the head, throat, chest, abdomen, or skin.

Affections of the Head The incidental affections referrible to the *head* are chiefly congestion in the brain or its membranes, meningitis, and a convulsive affection allied to epilepsy.

In all cases of typhus and in the advanced stage of synochus, it seems probable that there is a tendency to a *Congested state of vessels* in the whole internal organs, especially perhaps in those of a membranous structure, and among the rest in the *brain and its membranes.* This appears probable from the state of all the membranous surfaces visible from without, such as the skin, the conjunctivæ, the Schneiderian membrane, and the lining membrane of the mouth and throat, which are all of them often seen to be dark and unusually vascular. It is scarcely correct to consider this state a secondary, or at least an incidental, affection. It is probably the consequence of the depressed state of the nervous system, which has been already often insisted on as one of the essential circumstances of primary fever. It lies in the ordinary course of events: it is secondary in one sense, in so far as it is consecutive; but it is not incidental. In some cases, however, congestion of the brain is so great in degree and so prominent in its symptoms, as to become a highly important local affection; and in this sense it deserves mention in the present place, while passing from the essential symptoms of primary fever to the more purely secondary disorders. The symptoms of inordinate congestion in the brain and cerebral membranes are dingy redness and heat of the face, as well as heat over the integuments of the head, dark and minute injection of the conjunctivæ of the eyes, an extreme degree of stupor, aggravated muttering delirium, great feebleness and increased frequency of the pulse, irregular distribution of temperature in the extremities, a dark, dry tongue, which cannot be protruded,—all the symptoms in short of the most highly developed state of typhus. This is the most frequent cause or manner of death from continued fever in the British Islands, as well as in many other countries. On some occasions the symptoms of cerebral congestion show themselves at so early a period in the disease, and so generally, as to impart a peculiar character to the epidemic, and to have led some to describe such a fever under the distinguishing name of *Congestive typhus.* But it is probable that all cases of true typhus are attended more or less with this affection.

The frequent occurrence of cerebral congestion, and the similarity of its symptoms and morbid appearances to those of certain forms of cerebral inflammation, have led some pathologists, with *Dr. Clutterbuck* at their head, to imagine that fever is essentially a *Meningitis*. This is undoubtedly a mistake, and it was clearly a happy conception, for which medicine is mainly indebted to the late *Dr. Armstrong*, to characterise the local derangement as congestion. True meningitis is a very rare affection, as secondary or incidental to continued fever. There are at least few apparent cases of it, which may not be as correctly referred by the symptoms to congestion. And indeed, where the symptoms are characteristic, and the diagnosis during life is shown to have been justified by unequivocal appearances after death, it generally admits of question, whether the disease ever truly was continued fever or any thing else than a primary local inflammation. It is a strong proof of the reasonableness of this question, that unequivocal meningitis is exceedingly rare, where alone there can be no doubt of the fever being primary, in cases of fever clearly referrible to infection. In one shape meningitis has been thought by some to be not uncommon in fever. In persons at or beyond the middle term of life, who have been long addicted to intemperance, the symptoms often put on a very aggravated character from an early period, being compounded as it were of those of congestive typhus and delirium tremens. The delirium comes on earlier than usual, and is intense; there is great tremor of the hands, a highly flushed state of the countenance, and much injection of the conjunctivæ; coma supervenes speedily; and intercurrent convulsions are not uncommon. In such cases, which for the most part terminate fatally, unusual injection of vessels is found in the membranes of the brain, and likewise an unusual amount of effusion of serosity in the subarachnoid cellular tissue, as well as in the ventricles and base of the brain. These phenomena, however, present nothing which may not be referred with equal or greater propriety to congestion; they are the symptoms and anatomical characters of congestion in its most aggravated degree. Meningitis, it is true, is indicated by symptoms closely similar; and, when fatal in the early stage, may present no other appearance after death but congestion or serous effusion. Still this fact will not entitle the pathologist to assume that congestion becomes inflammation in the cases in question. There is nothing in the phenomena during life to warrant such a doctrine; the effects of remedies in particular furnish no corroboration; and anatomical evidence is wanting, so long as there are not found, what is undoubtedly very rarely found in true continued fever, occasional instances of effusion of lymph, or at least capillary vascularity, without gorging of the larger vessels and sinuses.

It has been just observed, that in some cases of bad congestive typhus, occurring especially in drunkards, intercurrent convulsions are apt to present themselves. But a *Convulsive affection*, allied to epilepsy in its characters, also occurs at times, independently of the constitution of intemperance, and even of any marked degree of congestion in the brain. It is a rare incidental disorder. It is perhaps always fatal. It appears most generally towards the middle or close of the second week, but sometimes so early as before the termination of the first. It is occasionally preceded by drowsiness and an unusual degree of headach for a day or two: but more commonly the patient is seized on a sudden with coma, convulsions of the trunk, extremities, and face, copious perspiration, hurried convulsive breathing, a rapid, excessively jarring, but easily compressible pulse; and death ensues in the course of one, two, or at most six hours. No appearance is ever found within the head to serve as an explanation of this remarkable incidental disorder; but the writer may mention, that in every case which has come under his notice since the publication of *Dr. Bright's* hospital reports, the kidneys have been found more or less affected by the granular degeneration, which he was the first to indicate with precision. It must be farther observed, that, where this organic derangement of the kidneys subsists, death sometimes takes place from convulsions, preceded for a few days

by an affection, not unlike mild typhus; and that such cases are accordingly apt to be confounded with continued fever.

Affections of the Throat. The incidental affections referrible to the *throat* are chiefly *cynanche tonsillaris, aphthous ulceration* of the throat and mouth, *cynanche laryngea,* and *cynanche parotidæa.* These disorders, with the exception of cynanche parotidæa, appear most frequently during the harsh irregular weather which precedes in this climate the approach of winter, and follows its departure, more especially during the prevalence of northerly winds. They are often the source of much annoyance to the patient; but they are seldom in themselves the source of danger — the whole of them, not excepting even cynanche laryngea, having a tendency to become resolved in the progress of the fever, and being for the most part amenable to treatment. It seems unnecessary to dwell on the special symptoms of these local disorders. Cynanche parotidæa, so far from being any sign of danger, is not unfrequently a concomitant of the crisis or turn of fever; and, from a remote period, has therefore been commonly held by nosologists to be an auspicious sign in circumstances otherwise favourable. It is not, however, so invariably auspicious as many imagine; it is often too the source of great distress; and, in severe fever, it is prone to run on to suppuration, especially in unsound constitutions.

Affections of the Chest. Next to congestion of the brain and its membranes, there is no class of incidental diseases more important than those referrible to the *chest.* In the British Islands, and above all perhaps in Edinburgh, they are the most frequent of all secondary affections; so that, amidst the tendency of modern pathologists to the doctrines of Non-essentialism, it is rather remarkable that no one has taken up with the chest as his hobby, for seating the local cause of fever.

Catarrh, indicated by cough, at first dry, afterwards with clear mucous sputa, and by mucous murmur attending respiration, is an exceedingly common accompaniment; and sometimes, at particular seasons, scarcely a single case occurs in hospital practice without more or less of it. It often occurs very early in the fever, sooner perhaps than any other incidental affection; and hence the patient is sometimes at first deceived, and his attendant puzzled, as to the real nature of his attack. But for the most part it is secondary in point of importance; frequently it disappears in a few days under mild treatment; seldom does it influence materially the course of the fever; and very rarely is any risk run from its usual termination in cases of idiopathic catarrh,—mucous gorging of the bronchial tubes. This incidental disorder must be distinguished from one which considerably resembles it in the symptoms, but which arises from a different cause and at a different period of fever. In the advanced stage of typhus or synochus, especially where the cerebral oppression is considerable, patients are very subject to a short, hacking cough, the exertion for which in their exhausted condition causes much general distress and uneasiness, and may even induce them to complain of pain when questioned on the subject. As there is usually in this state short hurried breathing, the result of mere debility, and sometimes also a little clear mucous expectoration, the symptoms may lead to a suspicion of catarrh or obscure pneumonia being present; and the inexperienced are apt to commit this error in diagnosis, and to treat the affection unnecessarily and injuriously as of the nature of inflammation. From pneumonia it may be distinguished by the patient being able to take a full breath without uneasiness, by the clearness of the chest everywhere on percussion, and by the stethoscope indicating merely a slight, dry mucous murmur at the extremity of inspiration chiefly. From proper catarrh it is principally distinguished by the period of its occurrence in the course of the fever, and by the inconsiderable expectoration which attends the cough, even where it has lasted several days. This affection passes off promptly after the fever takes a favourable turn, and without the aid of any express remedies. The rationale of it seems to be, that the pulmonary circulation partakes of the congestive disorder of the capillary circulation at large; and that the cough

arises from the irritation of the injected mucous membrane, or obstruction of the passage of blood through the vascular system of the air-cells. It may be conveniently distinguished by the name of *Congestive Catarrh.* In the latter stage of fatal cases of typhus or synochus, the affection becomes accompanied with serous effusion, especially in the depending portion of the lungs, where it is seen after death, and where during life it is indicated by the stethoscopic sign of crepitation.

Pneumonia and *pleurisy* are on the whole rare local affections in the course of fever; yet they are sometimes unequivocally developed, and for the most part under the cooperation of obvious exposures. They are most frequent in the latter stage of all the three forms of fever; and in that case they are apt to continue after the primary fever subsides, and to run their own proper course. When they occur at an early stage of the fever again, they are in general subdued with little difficulty, if discovered in time; and then the fever may continue its course uncomplicated. Both pleurisy and pneumonia are sometimes met with in the early stage of convalescence, as the result of undue exposure to atmospherical vicissitudes. It may be also observed of either, but especially of pleurisy, that where it appears to originate during fever or convalescence, the inflammatory disorder is sometimes found on careful inquiry to have existed in an obscure form for some time before the invasion of the fever. It is unnecessary to detail the particular symptoms of these two diseases when secondary to fever, because they present no peculiarities in the febrile state. The only circumstance requiring consideration is, that the torpor of the senses and mental faculties may render the patient unaware of his condition, or incapable of complaining of it; and that the practitioner, wherever either is suspected to exist, must attend more to the sputa, to the sounds elicited by percussion, and to the indications of the stethoscope, than to any other information, such as may be obtained by questions. There appears to be some epidemics of fever, where pneumonic inflammation is exceedingly prevalent as a secondary disease, insomuch as almost to form the epidemic character of the fever, and to be a common immediate cause of death. No epidemic of this kind has been observed of late years, especially since the improvements introduced into the diagnosis of pneumonia by the discoveries of Laennec; and the chief observations on the subject were made a considerable number of years ago. It is not improbable that the supposed pneumonia was nothing else than the congestive affection of the lungs, described under the head of *Catarrh.*

Affections of the Abdomen. The secondary affections of the abdomen which occur during continued fever, are some of them objects of extraordinary interest in the present day; to all, on account of their great frequency; and, to not a few, as supplying in their opinion evidence against the nonessentiality of fever. There is scarcely any organ in the abdomen which is not at times affected during fever in such a way as to constitute an incidental or secondary affection. But the most important disorders are an obscure affection of the stomach, of the nature of inflammation or irritation,—swelling and subsequent ulceration of the muciparous glands of the intestines, constituting the dothinenteritis of late pathologists,—and derangement of the hepatic organs attended with the external symptom of jaundice.

A common accompaniment of continued fever is an obscure disorder of the stomach, allied to *Gastritis.* In this country we frequently meet with cases where the patient is affected, particularly towards the close of the first and beginning of the second week, with severe sickness, frequent vomiting, tenderness in the epigastrium, or positive pain increased by pressure. These symptoms, which are more frequent in other countries, and especially in France, have been assumed to depend on inflammation in the mucous membrane of the stomach; while others ascribe them with greater probability to mere irritation only, connected, it is likely, with a congested state of the organ, or to mere functional disturbance depending on depressed action of the brain.

According to a late fashionable doctrine, that of *Broussais*, who has still his followers in many places, this local affection is a real inflammation, always present more or less, and not merely an accompaniment, but likewise, in connection with a similar disorder of the intestines, the essential cause of all continued fevers. There are now comparatively few who adhere to this doctrine in its full extent; in Britain its admirers were never distinguished either by their number or by their eminence; and certainly it would have been odd, had many converts been found among those who have faithfully observed on the great scale the phenomena of the British epidemic fevers. The symptoms in question are frequently absent altogether; and when present, if they are to be regarded as evidence of inflammation, all that need be said is, that, for so formidable a disease as inflammation of the mucous membrane of the stomach, the symptoms are wonderfully easy to subdue, since they seldom resist a few leeches or a blister. At times, however, the affection is severe, the nausea being excessive, the vomiting frequent and constantly excited by drinks or medicine, and the tenderness and tension very distressing. It is not easy to pronounce what the nature of this affection may be in such cases; but, as happens in milder instances of the like kind, it is for the most part easily subdued by gentle antiphlogistics; and, except the relief given to local suffering, no manifest change takes place in the phenomena of the fever. Such are the results of British experience on this much agitated topic.

In other instances of fever it is supposed that the mucous membrane of the intestines may be similarly affected, giving rise to a secondary *Enteritis*. In some cases even in this country, there is observed in the progress of fever distension and firmness of the abdomen, tenderness or positive pain, with an anxious countenance, and either constipation or diarrhœa. But abroad, and above all, it appears, in France, such cases are very frequent, and for the most part severe. Two affections have been indicated, one consisting probably of irritation, possibly of incipient and mild inflammation, of the intestinal mucous membrane generally; the other, a far more formidable disorder, consisting of inflammation, suppuration, and eventually ulceration, of the solitary and conglomerate glands of the intestines, in concurrence generally with enlargement and sometimes suppuration of the mesenteric glands. These two affections, along with the supposed variety of gastritis just described, are thought by many to be invariably present in continued fever, as it shows itself in France, and are believed conjunctly to be the true cause of fever. The latter intestinal disease, in consequence of the recent researches of *Bretonneau* and *Louis*, is believed by many to be invariable in typhus; and the anatomical lesions connected with it are believed to constitute the essential cause or anatomical character of typhoid fever. Both affections are undoubtedly met with in the fever of this country. Much more frequently, however, both are absent; and the common rule is, that a case of fever passes through all stages of the disease without any symptom whatever referrible to a disorder in the bowels, except some flatulent distension, vague uneasiness rather than absolute pain, and constipation. But in particular diarrhœa, the most invariable symptom, both of the milder and of the more severe disorder, is comparatively a rare incident, at all events far less common than the very opposite condition.

It is not easy to distinguish the two affections of the bowels by their symptoms; for in both of them there is fulness and tension of the abdomen; frequently, though not always, tenderness; sometimes griping pain; and very generally a frequent, watery, yellow diarrhœa. That such secondary symptoms must in general arise in the continued fevers of this country from nothing more than irritation, or at most a low state of incipient inflammation of the intestinal mucous membrane, would seem sufficiently obvious from the simple fact that they are, for the most part, very easily checked, or that, where they do continue for some time unsubdued, they seldom add much to the exhaustion occasioned by the fever, and eventually disappear of themselves, either by degrees before the fever ceases, or more promptly after a crisis takes place.

They are certainly, in by much the greater proportion of cases, regarded by British practitioners without alarm; and not unfrequently a mild yellowish diarrhœa seems even to keep down the force of febrile action in cases of synochus ushered in by a sharp inflammatory stage, and cannot be altogether arrested without apparent injury from aggravation of the general fever.

The occurrence of *Dothinenteritis* is a very different incident. This very interesting disease, which, as formerly stated, seems to have been first observed in 1763 by *Roederer* and *Wagler*, and again in 1813 by *Petit* and *Serres*, has of late years attracted much attention, especially in France, since the investigations of *Bretonneau* into its anatomical characters, and the elaborate and precise inquiries of *M. Louis* into its relations to fever. The latter eminent pathologist concludes, as the result of his researches, that it is never wanting in true typhus, and is the local cause of that variety of fever — an opinion in which he is followed by many. There can be no question, however, either that dothinenteritis is merely an occasional, incidental, or secondary, affection during fever; or that it is a wholly different disease from that to which the name of typhus has been long appropriated in this and other countries. For the invariable experience of British practitioners extensively conversant with the features of typhus is, that enlargement of the glands of Peyer and Brunner, situated in the inner membrane of the intestines, is a rare, and in many parts of Britain a very rare, occurrence. *M. Louis*, as formerly mentioned, is now inclined to think that the two diseases are essentially different. Such may well be the case. All that British pathologists can reasonably hold out for is, that the dothinenteritic affection shall be admitted to present itself at times as secondary to typhus, since in Britain it occurs only occasionally during epidemics of typhus, and the cases where it is seen originate, as clearly as other cases of typhus, in infection. The term typhus, or "typhoid affection," ought not to be appropriated, as M. Louis desires, to this local affection — to this newly discovered disease — which is far more frequently absent than present in what used to be called typhus. No one however will deny that the local disease, secondary in one circumstance, may become primary in another, and even present itself as such in the epidemic form. In short, let the name originally proposed by Bretonneau be retained as simply describing its anatomical character (δοθιὴν, a pimple, and ἔντερον, the intestine), and it may be granted that, like catarrh, pneumonia, and other inflammatory local disorders, dothinenteritis may both occur as a primary disease, and also as secondary to typhoid fever.

As a farther illustration of the secondary character of this affection in Britain, it may be observed, that instances of it are not only far more uncommon here than in France, but likewise that their frequency seems to differ much in different quarters of this kingdom. From the accounts lately published of epidemic fever in London, Manchester, and Edinburgh, for example, the disease would appear to be decidedly most frequent in London, and least frequent in Edinburgh. In Edinburgh it is unquestionably a rare concomitant of fever. In the infirmary it has been constantly and diligently looked for during the last sixteen years in several epidemics; yet it is found only often enough to make the pathologist acquainted with its phenomena, and keep him in mind of its existence. On one occasion only, during the latter months of 1829, when a dysenteric tendency showed itself to an unusual degree in the population generally, and, above all, in the hospital, has it been observed to constitute an appreciable proportion of the fever cases.

The symptoms of dothinenteritis are sometimes obscure; and, if the affection be not fully formed before the fever has advanced far, the typhoid oppression renders them very indistinct, so that no farther indications are perceptible than the equivocal signs, flatulent distension, uneasiness on pressure, and yellow diarrhœa. When its external characters are well-developed, there is, in addition, general tenderness or pain, felt especially on pressure in the right iliac region, short hurried breathing, commonly a red, dry, chapped tongue, and sometimes

vomiting — an important sign when it occurs late in typhus. It is commonly attended at an early period, and almost always sooner or later, with a profound state of typhoid oppression. If we are to grant to *M. Louis* and his countrymen, that it may occur as a primary idiopathic disease, we must also concede, that its symptomatic fever is peculiarly typhoid, undistinguishable by any essential characters from the true primary typhus of British pathologists. Its course is very frequently unfavourable, and death seems in general owing, not as in dysentery, to exhaustion, but to gradual aggravation of the typhoid state. In a few instances, however, it terminates in intestinal perforation, indicated by sudden acute pain in the right iliac region, spreading burning pain over the abdomen, sickness and vomiting, Hippocratic expression, dreadful anxiety and extreme exhaustion, followed by death in the course of from eighteen to thirty-six hours. A remarkable proof of the profound nature of the typhoid coma which attends the disease is, that sometimes even perforation and consequent peritoneal inflammation take place, as shown by dissection, without any particular signs of the event having been observed during life. In favourable cases recovery is commonly slow, provided the symptoms of the local affection be well-marked, for the patient has to pass through the slow process of restoration of the healthy state of the intestines from suppuration or ulceration. Nevertheless it is seldom, at least in this country, that he does not eventually overcome the disease, should he not sink under the typhoid depression of the nervous system in the early stage.

The only other important abdominal affection of a secondary nature which requires mention, is *disorder of the hepatic system*, accompanied with jaundice. This is a rare complication, occurring chiefly in the autumn months, and principally in those epidemics where the inflammatory type is prevalent. Yet it is important, because cases where it occurs commonly prove fatal. The exact nature of the affection is not apparent. The symptoms are, rapidly formed jaundice, sickness with frequent vomiting, but without particular uneasiness in the region of the liver, extreme prostration of strength, much tendency to coma at an early period of the fever, speedy sinking of the pulse, and, in general, bilious stools. The symptoms show themselves in the course of the first week. If they do not begin to abate in two or three days, death occurs in a few days more, under a state of extreme exhaustion and deep coma. Should the yellowness of the skin, however, begin to diminish, the other secondary symptoms soon subside also, and the fever runs its usual course. Some have imagined this affection to be allied in nature to the yellow fever of hot countries, but with what justice it is not very easy to say.

The affections of the *skin*, which occur as secondary to continued fever, are of much importance, not merely on account of the danger attending some of them, but likewise because they often singularly aid the physician in forming his prognosis. The chief affections requiring mention are, the various forms of *petechiæ*, an eruption analogous to *measles*, *vibices*, *miliaria*, *sloughing*, and *erysipelas*.

Petechiæ of one kind or another are so common in some epidemics of fever, that it is rare to find a case without more or less of them. They often escape notice, it is true, because they are not expressly looked for in the quarters where they may most generally be found. At the same time there is no ground for the notion, lately entertained by some, that in real infectious fever, or, as stated by others, in true typhus, petechiæ are never entirely wanting. This notion has clearly arisen from partial observation, confined to particular epidemics. Extended observation in many epidemics leads to the conclusion, that in continued fever of all types petechiæ are not essential, but secondary. Three kinds of eruptions have often been comprised under the generic term petechiæ: —1. One, which is exceedingly rare, but which is occasionally remarked in the advanced stage of bad synochus or typhus for a short time before death, consists of small, pale brown, lenticular spots, without any elevation or roughness of the skin, and much resembling freckles. 2. Another, which is very common

in some epidemics, and especially where the early stage of fever presents the inflammatory character, forms small, dark, reddish-black, roundish, accurately circumscribed, and often closely-crowded spots, without elevation of the skin, and much resembling fleabites. Their resemblance to fleabites is such, that, on the one hand, the latter are often mistaken for petechiæ; while, on the other hand, some physicians will insist that real petechiæ are nothing else but fleabites. The two appearances, however, cannot be mistaken by a careful observer, because the petechial spot does not present the little dark point in the centre, which may be invariably seen in the fleabite, either with the naked eye, or with the help of a common magnifier. Sometimes the petechiæ are few in number, and readily escape notice; in other instances, on the contrary, they are excessively crowded. Their usual seat is upon the breast, shoulders, fore-arms, and legs; but they may be seen also on all other parts of the body except the face. They generally make their appearance towards the close of the first or beginning of the second week, and certainly not on a specific day, like the eruptions of the febrile exanthemata, as some have maintained. They are observed to occur chiefly in severe cases, but, from frequent observation in the epidemics of Edinburgh, they do not necessarily indicate danger; on the contrary, the cases in which they appear have proved rarely fatal. The appearance is owing to a thin stratum of extravasation on the surface of the true skin, and appears connected with increased force of the circulating system, being most characteristic where reaction is high. This form of petechial eruption has become rare (1838) for a few years past. 3. The third variety presents more or less numerous spots, of a paler, rather lake-red or rose-red tint, irregular in shape, not distinctly circumscribed, but rather diffuse round the edge, with sufficient elevation of the skin to impart a sense of roughness to the finger, when drawn over a part where they are numerous. They present some resemblance to measles; and at times are so like that eruption, that the other symptoms must be looked to for the diagnosis. They present the same variety in number with the dark circumscribed petechiæ; they are usually most abundant over the chest, shoulders, fore-arms, legs, loins, flanks, and abdomen; and they are not unfrequently found loosely scattered round the loins, flanks, and upper part of the belly, although not visible any where else, so that, if not sought for, they may escape notice altogether. Different accounts have been given of the usual time of the appearance of this form of petechiæ. In the epidemics of Edinburgh it appears about the seventh day for the most part, sometimes a day or two later or earlier. Elsewhere it is stated to occur very regularly on the fourth day; at least, some have described a measly-like eruption, which appears to come under the present head, and which is said to break out so regularly on a particular day, and that day the fourth of the fever, as to have warranted in some measure the conclusion, that the disease was a variety of continued fever, assuming the general habitudes of the eruptive fevers. The diffuse pale petechiæ occur almost entirely in epidemics and cases of the typhoid type. It is, perhaps, invariably associated with a severe attack; and cases where it appears often prove fatal. According to M. Louis it is an invariable concomitant of the intestinal disease, which he considers the anatomical character of true typhus. But, in this country at least, it is also very often observed where there is no such local disorder.

It appears, then, that the occurrence of petechial eruptions in continued fever has led to a considerable variety of speculations as to their nature and the nature of the disease in which they are presented. Some have been contented with arranging the cases under the general head of continued fever, but with the special title of petechial fever; others hold this petechial fever to be a specific fever, originating in a specific infection, and capable of producing, or of being produced by, itself alone: others maintain that, as the eruption appeared to them to break out very regularly on a special day, the disease is specific, and one of the febrile exanthemata, among which accordingly they are

inclined to arrange it; and lastly, by many French pathologists one variety, the diffuse pale petechia, is thought peculiar to dothinenteritis. In the opinion of the writer, founded on the observation of several epidemics of fever, varying much in type, none of these doctrines is tenable except the first, which assigns a specific name, for the sake of convenience, to a mere variety of common continued fever. And petechiæ can be correctly regarded in no other light than as an incidental circumstance in fever, neither confined, nor essential, to any one species of it.

In the preceding statement a considerable variety of eruptions have been comprehended under the general designation of petechiæ. But some have distinguished, under the name of *measly eruption*, one of the varieties of it, where the spots are clustered in groups, and distinctly somewhat elevated, so as to resemble closely the eruption of rubeola. This form appears to occur in the same circumstances with the diffuse pale petechia, namely, in cases of typhoid fever and in the typhoid stage of synochus; there seems no practical reason for viewing it as a distinct eruption; and, indeed, the one form may be observed passing into the other, both in the same case, and in different cases of fever.

Allied to petechiæ, in all probability, as to nature, are the *vibices*, which sometimes show themselves late in fevers of the typhoid type, and also, though more rarely, in the early period of those which commence with an inflammatory stage. These are large spots, varying in size from that of a pea to that of a half-crown or upwards, of the colour of venous blood, diffusely circumscribed, roundish or irregular, sometimes with, but more commonly without, elevation of the skin, and bearing a considerable resemblance to the marks of bruises. They are most generally seen on the parts on which the body rests, the shoulders, back, nates, calves, heels, elbows, ears, occiput; but not unfrequently they are also seen on every other part of the body except the face. They are, in the majority of cases, connected with great depression of the pulse and exhaustion of the nervous system; yet sometimes, like the analogous eruption of *hæmorrhœa petechialis*, they are rather associated with a state of reaction, and appear therefore early in the disease, and in those types which are inflammatory at the commencement. They occur only in the most severe cases; and, in typhoid fever, they are for the most part of fatal import. If the patient escape the typhoid exhaustion which they accompany, they are apt to lead to gangrene in those parts which are subjected to pressure.

Gangrene and *sloughing*, however, are more commonly preceded, not by vibices, but by *erythema* merely. An erythematic inflammation, affecting first the mere surface of the true skin, and gradually extending deeper, is a frequent occurrence in severe continued fevers, which present a marked typhoid character in the latter stage. It may occur wherever the body is subjected to pressure from its position; but is much more frequent on the nates, the lower end of the sacrum, and the back of the shoulders, than any where else. If not arrested by remedies, or by the early resolution of the fever, it is extremely apt to put on an ash-grey colour on the surface, which is an almost infallible mark of approaching gangrene of the part. Sloughing, of course, ensues; and the patient may die exhausted of this disorder after he has recovered from the proper symptoms of fever. A fatal event, however, is by no means so frequent in these circumstances as might be looked for. If the nervous system rallies from the state of typhoid depression, the sloughs for the most part separate, the cavities heal up by healthy granulation, and complete recovery takes place. In some epidemics vibices and erythema, with consequent sloughing, are unusually prevalent, and then occasion many deaths, especially in persons beyond the middle term of life.

Erysipelas is at times a rather common, and always a very troublesome, secondary disorder. It occurs chiefly when idiopathic erysipelas prevails, and, above all, when it is epidemic in hospitals, as secondary to wounds and operations. In fever the usual period for erysipelas manifesting itself is rather

after the crisis has begun to form, than during the full height of the fever. It appears, like idiopathic erysipelas, most commonly on the face and head; and it runs precisely the same course, sometimes terminating early in symptoms resembling meningitis, sometimes leading to spreading inflammation of the cellular tissue underneath the skin, and serous effusion or sloughing; sometimes resolving itself simply, or by vesication. It is always an unfavourable occurrence; and a large proportion of cases, where it is unequivocally formed, prove fatal.

The only other eruption of the skin which requires notice is *Miliaria*. Frequently in the inflammatory type of continued fever, and much more rarely in its typhoid forms, an eruption appears over the body generally, but in particular over the breast, shoulders, neck, and abdomen, consisting of small white, rarely reddish spots, of the size of a pin's head, distinctly elevated, and filled with a clear fluid. They appear, for the most part, rather early in the disease. Sometimes they seem connected with sweating, break out immediately after a diaphoretic crisis, and then constitute what authors term *sudamina*. Frequently, however, they show themselves during the height of high inflammatory fever, and before the appearance of sweating. They are a favourable sign rather than the reverse; at least they occur most frequently in those forms of fever whose average mortality is the lowest—namely, where reaction is the predominating character.

Sequelæ of Fever. To the foregoing observations on the secondary disorders which accompany continued fever, may be appropriately annexed a sketch of its *sequelæ*.

Here, in the first instance, it may be observed, that serious sequelæ are, on the whole, rare; that the body generally rallies promptly and steadily from an attack of ordinary fever, when convalescence is fairly established; and that the restoration to health is seldom interrupted by incidental diseases. Such is found to be remarkably the case with young persons between puberty and early manhood. In them it is very commonly observed, where no infirmity of constitution preceded the fever, that the body becomes even more robust than before; some infirmities of constitution, such as dyspepsia or derangements of the bowels, seem to be carried off; and not unfrequently young adults, who have ceased, or nearly ceased, to grow, gain a considerable accession of stature during the short period of their illness. Serious sequelæ present themselves chiefly in the following circumstances;—where marked infirmity of constitution preceded the attack of fever; where the patient has been imprudently subjected to some rash exposure during early convalescence, or commits some other important error in regimen; and, finally, where the individual is considerably past the middle term of life. Even under these co-operating circumstances sequelæ are rare; and fever really seems to deserve the reputation it has long enjoyed, of having a tendency to carry off the seeds of lurking diseases. Many instances of apparent sequelæ are nothing else than the full development of inveterate maladies, formed before, and merely latent.

Among the sequelæ may first be mentioned Relapse. The other consequences which have been witnessed, or alleged to occur, are principally rheumatism and neuralgia—partial palsy—œdema and phlegmasia dolens—various febrile inflammations, especially peritonitis and pleurisy—phthisis pulmonalis and mania.

Relapses are apt to occur more or less after all continued fevers: but they are rare in those of the typhoid type: they are more frequent in synochus; and most frequent in mere inflammatory fever. In the inflammatory epidemic of 1817-20 in Edinburgh they occurred, according to Dr. Welsh, in no less than almost a fifth part of the cases. When they occur in typhus, and even in synochus, they may commonly be traced to some error in diet or regimen, most generally to the former. It is well-known that, even in health, the digestion of a meal is followed by a certain degree of exaltation of the pulse and animal temperature, constituting a kind of febricula. During convalescence from continued fever, especially in the young, this excitement is often very

considerable, the pulse rising from 60 or 70 to 90, the heat of the skin also increasing, the pulse at the temples throbbing somewhat, and the general disturbance coming to a close in two hours or more by the supervention of diaphoresis. Where the patient violates the rules of correct regimen by imprudent excesses in eating during early convalescence, this febricula is apt to pass into confirmed pyrexia, and his fever is renewed. Relapses, from whatever cause they spring, are commonly ushered in with an attack of rigor or great chilliness; and vomiting is not unfrequent also. The symptoms may afterwards present all the severity of the original attack, or even more; and occasionally they prove fatal. But, for the most part, they are slighter; and their average mortality is unquestionably much less. A remarkable fact, formerly quoted in support of the doctrine of the essential character of continued fever, is, that in relapse secondary affections are decidedly more uncommon than in the primary attack.

In one form of fever, namely synocha, the circumstances of relapse are sometimes exceedingly singular and interesting. In the synocha, formerly described as having been common in Britain during the earlier part of the last twenty-five years, and where the fever in a considerable proportion of cases was abruptly resolved by a fit of copious sweating, relapses were so exceedingly frequent, as to have been thought by some, not without an appearance of reason, to constitute a part of the primary attack, rather than to merit the name of relapse in the strict meaning of the term. In the cases alluded to, the patient's convalescence went on steadily and swiftly for a few days, till at length the pulse became perfectly natural, the tongue clean and moist, the appetite good, the digestion natural, the strength much improved, — in short, complete health seemed on the point of being restored; when at last, very regularly about the close of the thirteenth or during the fourteenth day from the commencement of the primary attack, violent rigors set in, commonly accompanied with vomiting; and, in an hour or two, the whole symptoms of synocha, as described above, succeeded in regular order and in great force. This state lasted for three days, when the fever again ceased abruptly with profuse perspiration; and afterwards convalescence went on steadily, and without farther interruption. It seemed that no precautions as to diet and regimen were of any service in averting this relapse: it was as frequent among those who were confined to bed and kept on low diet, as where considerable latitude was allowed upon an opposite system; and the latter cases generally had rather a milder attack. Relapse was far more rarely attended with local inflammation than the primary attack. It was very seldom fatal. In one or two instances only it was protracted into a synochus, and proved fatal in this shape.

Partial rheumatism and *neuralgia* are common sequelæ of continued fevers of all kinds. They usually show themselves during convalescence in its early stage, and most frequently after fevers tending more or less to the inflammatory type; but, above all, subsequently to synocha, where it terminates by diaphoretic crisis. The parts most commonly affected are the shoulders. It is an affection which may be the source of much suffering for the time; but it seldom lasts out one week, always disappearing with the return of strength. Acute rheumatism is rare, and arises, like its attacks in ordinary circumstances, under some decided exposure, and probably in the predisposed alone. Persons convalescing from fever generally retain for some time a power of resisting exposures without injury, to a degree which would not be anticipated. There are exceptions; yet, certainly, the general rule is, that, after attacks of fever of moderate duration, the body, however much reduced, withstands cold with unusual facility.

A remarkable sequela, not frequent, yet sufficiently so to have attracted the attention of those conversant with fever in the epidemic form, is *partial palsy*. The parts most generally observed to be affected are the deltoid muscles, and the joints of the knees and ancles; but the muscles of the face, at times, also

suffer. The paralysis of the particular muscle, or of the particular movements of a joint, is sometimes complete, more frequently incomplete, seldom attended with any diminution of sensation, occasionally accompanied by pain, more generally not, and altogether independent, either of signs of an affection of the head, or of any appreciable disturbance of the circulation or digestion. When it affects the limbs, it has been mistaken by the inexperienced for an affection of the spine, and treated accordingly by persons who find in that organ a cause for every disorder which is to them otherwise unintelligible. But, for the most part, it ceases gradually after convalescence is firmly restored, and it is best managed by invigorating treatment and regulated exercise. Sometimes, however, it is very inveterate.

Œdema has been mentioned by most writers on continued fever as a frequent sequela in severe cases. As confined to the ancles only it is not altogether uncommon in early convalescence, when the patient first takes walking exercise; but it is then a trivial complaint, dependent on mere debility, which never becomes considerable, and disappears as the strength returns. Anasarca of more considerable extent is, on the contrary, rare; and though usually ascribed, in common with its slighter form, to debility, may be justly suspected to occur in connection with some old organic disease, and more especially with granular degeneration of the kidneys, or with diseased heart.

During the early stage of convalescence, an affection occasionally presents itself, which resembles the *Phlegmasia dolens* of puerperal women, and is sometimes apt to be mistaken for œdema. It is generally preceded by some general fever. Its symptoms are pain, swelling, tension, heat, and glistening whiteness of one limb, extending from the groin downwards, with inability to move the limb. It generally ends in resolution and recovery; but amendment takes place slowly, and sometimes it terminates in serous effusion and diffuse suppuration of the intermuscular cellular tissue. It is in all probability a variety of subcutaneous cellular inflammation. Of this affection, which was first described by Dr. Tweedie in 1828 as an occasional sequela of fever in the London Fever Hospital, several characteristic examples occurred in the epidemic of Edinburgh in 1817-20.

Acute *febrile inflammations* are apt to occur during convalescence from rash exposures; but they are not so common as might be expected. They are most frequently observed in the wards of hospitals, where all patients are often alike exposed to cool or cold air, whatsoever the stage of their fever, and, in particular, are at times subjected to local draughts of cold air from open windows. In cold weather an attack of coryza, with or without symptomatic fever, is frequent among those who go out of doors prematurely. The species of local inflammation which are most common, are pleurisy and peritonitis; pneumonia and cynanche laryngea are less frequent. Peritonitis is the most common of them. These disorders generally put on a very acute character, commencing abruptly, and quickly running a fatal course, if not energetically treated. They seem to be more common after inflammatory fevers, and after synochus with a well-marked inflammatory stage, than after typhus.

A good deal has been said of the tendency of continued fever to bring on *phthisis pulmonalis* in the predisposed. The supervention of phthisis is held by some to be in the ordinary course of events. But if long and intimate observation of the progress of several extensive epidemics in Edinburgh may be adequate to decide the point, then it seems clear, that consumption is a very rare result, and its origin in fever as a predisposing cause very problematical in any instance. Consumption is most frequent at the very ages when fever is most frequent. If one disease then led to the other, the concatenation ought to be witnessed so frequently as to be placed beyond all possible doubt as a fact. Nevertheless, it seldom happens that a fever patient exhibits symptoms of incipient phthisis on throwing off the febrile state; and hence, where such an incident is observed, the presumption must be, that the seeds of the apparently supervening disease were sown before the attack of fever com-

menced. In most instances, indeed, this may be positively ascertained to be the case, on carefully inquiring into the history. Continued fever has clearly no particular tendency to lead to the formation of chronic organic diseases. On the contrary, as it has a marked tendency to remove functional disorders of the viscera—which, as already remarked, often disappear after an attack of fever—we may rather presume that organic diseases, which originate in functional disturbances, must in that way be sometimes averted.

Mania has been mentioned by some as an occasional sequela; but in common with other affections of the brain, whether acute or chronic, functional or organic, it is of extremely rare occurrence. No better proof than this perhaps can be given, of the little connection subsisting between continued fever and inflammation of the brain, or any other organic disease there. In the fevers of Britain no other organ is so frequently and so far disturbed in its function while the disease lasts; yet scarcely any other shows so little tendency to retain the traces of disease after the fever has thoroughly subsided. In some instances a certain feebleness of intellect remains for a few weeks, as shown by listlessness of the faculties, indisposition to mental exertion, sluggishness in conversation, and defective memory. But this state very seldom outlasts the restoration of the muscular strength. More generally the mind is, from the commencement of convalescence, in a state of integrity, and eventually is found to become more acute. Sometimes, too, there is from an early period of convalescence an extraordinary activity of the mind, clearness of thought, facility of expression, and brightness of memory, which even recals incidents long-forgotten.

Prevalence, Duration, and Mortality of Fever. It may not be out of place to wind up the preceding account of the symptoms of continued fever, essential as well as secondary, by some notice of its prevalence, duration, and mortality.

It is not easy to obtain a distinct conception of the *prevalence* of fever, in consequence of the want of sufficiently extensive and accurate statistical tables, showing the amount of cases relatively to other diseases, and to the general population, for a moderate term of years. There is no question, however, that if the average of a number of years be taken, and the general population of towns as well as of the country be included, fever will be found to constitute the most frequent of all diseases, and to occasion a larger proportion than any other of the general mortality.

The extent to which continued fever prevails, both absolutely, and relatively to other diseases, varies greatly in different years in the same place; it likewise varies much at the same time in places situated alike in most respects; and farther, places circumstanced to all appearance very much in the same manner, present marked differences in their liability to the disease at all times.

The progress of epidemic fever through a series of years is very well shown by the following table of its history in Edinburgh since 1817, founded on the documents in possession of the Fever Board. The numbers show only those cases which were sent into hospitals:—

	Years.	Cases.		Years.	Cases.		Years.	Cases.
Nov.	1817			1826	697		1833	878
to Nov.	1819	2470		1827	1837		1834	690
	1820	620		1828	1862		1835	826
	1821	413	Nov.	1829	619		1836	841
	1822	356	to Mar.	1830	163		1837	972
	1823	248		1831	191		1838	1994
	1824	218		1832	1225	to Mar.	1839	1981
	1825	328				to Oct.	1839	338

The best view yet given of the prevalence of fever in a great town is to be found in the excellent statistical account of fever recently published by Dr. Cowan of Glasgow. By uniting two of his tables the following valuable facts are obtained for a period of forty-three years prior to 1838, showing the pre-

valence of fever in that class of the population which resorts to hospitals, so far as may be deduced from hospital admissions merely:—

Year.	Population.	Admissions. General.	Admissions. Fever.	Year.	Population.	Admissions. General.	Admissions. Fever.
1795	66,578	226	18	1817	- -	1886	714
1796	- -	338	43	1818	- -	3254	2336
1797	- -	545	83	1819	147,197	2825	1594
1798	- -	569	45	1820	- -	1570	289
1799	- -	631	128	1821	147,043	1454	234
1800	- -	733	104	1822	- -	1596	229
1801	83,769	702	63	1823	- -	1759	269
1802	- -	729	104	1824	- -	2091	523
1803	- -	806	85	1825	- -	2438	897
1804	- -	678	97	1826	- -	2317	926
1805	- -	719	99	1827	- -	2725	1084
1806	- -	700	75	1828	- -	3133	1511
1807	- -	726	25	1829	- -	2321	865
1808	- -	840	27	1830	- -	2010	729
1809	- -	886	76	1831	202,426	3183	1657
1810	- -	935	82	1832	- -	4119	2733
1811	110,460	826	45	1833	- -	3082	1288
1812	- -	877	16	1834	- -	3879	2003
1813	- -	1022	35	1835	- -	3260	1359
1814	- -	1135	90	1836	- -	5130	3125
1815	- -	1340	230	1837	- -	7200	5387
1816	- -	1511	399				

For nine years of this period prior to 1837, the same author has supplied the number of fevers treated at home by district medical officers paid for the purpose; and when the above numbers are corrected by the data thus furnished, the prevalence of fever will be found to stand as follows, for a population of about 200,000 inhabitants:—

Years.	Cases.	Years.	Cases.	Years.	Cases.
1828	2511	1832	3825	1835	1686
1829	2205	1833	1675	1836	3841
1830	1089	1834	2402	1837	7707
1831	1249				

It is probable that of all the great towns in Britain Glasgow has been for some time the most unfavourably situated as regards fever; and the statements of Dr. Cowan undoubtedly show a fearful increase in the extent of its devastations. But other great cities are not much behind it in this respect. In Edinburgh for example, during four severe epidemic visitations since 1816, each lasting between three and four years, the number of beds constantly occupied in the hospitals has varied from 120 to 150; and for some time past (Jan. 1839), the latter number has been often insufficient to meet the demands for admission. A very remarkable fact is, the slight extent to which fever prevails in some of the large towns in England, and the improvement which has gradually been attained in that respect with them, while in Glasgow and Edinburgh the case stands directly the reverse. Dr. Cowan shows, that, while in Glasgow, with a population of 200,000, the annual average of fever, deduced from seven years ending with 1836, has been 1842 cases; in Manchester, with a population of 228,000, it has been for the same period only 497; in Leeds, with a population of 123,400, only 274; and in Newcastle, with a population of 58,000, so little as 39. And he likewise states, that while in Glasgow the average fevers treated

annually in hospitals, between 1797 and 1806, was 88, and has latterly increased to 1842, in Manchester the average has stood nearly the same, notwithstanding the great increase in its population, having been 462 in the early period, and 497 recently.

The statistical results of hospital experience, even when corrected by that of institutions for visiting the poor at their own houses, gives probably a very imperfect idea of the real prevalence of fever in a community. In periods where there is no epidemic alarm, it seems likely that but a small proportion of the cases come under the notice of the statistical inquirer. And even in seasons of epidemic virulence, when the poor more readily seek assistance from public institutions, it would appear from the researches of *Dr. Cowan*, that little more than one third of the fevers in a great city are accounted for in this way. In 1835-7 the cases of fever treated in hospital, or by district medical officers, in Glasgow were 1686, 3841, and 1707 — in all 13,234 in three years: but reckoning from the annual bills of mortality, in which the deaths from fever are specified, and from the average mortality of fever in hospitals during these three years, there must have been altogether in that city 6180, 10,092, and 21,800 cases — or, in all, 38,074, — very nearly three times the number accounted for.

The *mortality* of fever has been made the subject of frequent investigation in all parts of Britain, and many important numerical statements have been published, which contribute to give a precise view of the influence of this scourge on the lives of the community.

An exceeding difference prevails in the relative mortality of fever, under a variety of essential or collateral circumstances. In the first place it is plain, that some types of continued fever are much more fatal than others. Synocha is very rarely fatal; synochus much more frequently; typhus the most fatal of all. Hence some epidemics are much more deadly in the same place than others. There is also a great difference in the mortality, from the same kind of epidemic, in different places; and such differences are often little susceptible of explanation. In epidemics presenting the inflammatory character the mortality has been observed, for a length of time, and upon a great scale, to be so low as one in 22, one in 25, or even one in 30. This was the fluctuation of the hospital mortality in Edinburgh, during the latter part of the epidemic of 1817-20; and an equally low average was observed in several parts of Ireland about the same period. In the recent epidemics of Edinburgh, which have assumed much more the typhoid or adynamic character, the average has been greatly increased. In the year 1826-7, in a total number of 1570 hospital patients, the mortality was one in 10·33. In the epidemic which has raged for some years past, the deaths have been still more numerous, in correspondence with a more purely typhoid type. The number of patients treated in the Edinburgh Hospital in 1837 and 1838 has been 1994 and 2062; and the proportion of deaths one in ten during the former year, and one in 6·27 during the latter According to *Dr. Cowan* the average mortality, deduced from the observation of an unusual number of cases, was, in 1835-7, one in 15, one in 12, and one in 10. These proportions are much exceeded in some of the great cities of England — a fact which seems the more remarkable, that fever is in them much less prevalent than in Glasgow or Edinburgh. According to *Dr. Bardsley* of Manchester the annual hospital average in that city has varied, between 1818 and 1828 inclusive, from one in $11\frac{3}{4}$ to one in $6\frac{1}{3}$; and the average of the mortalities for all these years is one in $8\frac{1}{4}$. In the London Fever Hospital for the same period, the averages, according to *Dr. Tweedie*, have fluctuated between one in 10 and one in 5; and the average of the whole annual mortalities of the period was so high as one in $6\frac{1}{2}$. Much more fearful mortalities, however, have been recorded than any yet mentioned. In Guy's Hospital in 1816 *Dr. Marcet* found the deaths to amount to one in 4; and, for a short period in 1799, *Dr. Willan* ascertained, that among the patients treated at home in connection with a dispensary in

London the average deaths were actually one half of the seizures. The mortality is seriously affected by liability to the entero-mesenteric affection, which has been described above as a frequent accompaniment of some epidemics. If *M. Louis's* experience be a fair representation of the general experience of French physicians in fever, the mortality occasioned by this bowel affection is fearful; for he lost 46 out of 132 patients, or one in 2·9.

To these facts may be appended a sketch of the influence of fever on the general mortality from diseases at large. On this important subject few precise facts have been made public, from which the average influence of fever may be determined for a series of years. But an extremely interesting view has been given by Dr. Cowan, of the relation of deaths in fever to the general mortality during the prevalence of the late virulent epidemic in Glasgow. In 1835-7 the deaths from fever alone were, according to the bills of mortality, which have been taken for some years past with unrivalled care, 412, 841, and 2180; and they constitute, in relation to the mortality from all diseases, one in 15·6, 10, and 4·7, annually; or, in the population at large, one in 570, 290, and 116. It has been supposed by some that epidemics of fever, although they may constitute a large proportion of the sickness of a place, and occasion a large proportion of the total deaths, nevertheless do not sensibly add to the mortality; and this statement is grounded on the fact, which seems well-ascertained, that epidemics of fever, by seizing upon the feebler constitutions, occasion a palpable diminution of other diseases. The reason however may be true, and yet the inference false; because fever, especially in the typhoid form, is a more formidable disease than the average of prevalent disorders: and that the inference is wholly false, appears abundantly from facts contained in the paper of *Dr. Cowan.* In 1824 the deaths were only one in 37 in the city of Glasgow; while, during the late epidemic of 1835-7, they have increased to one in 32·6, 28·9, 24·6. In 1835-7 the total deaths from all diseases were 7198, 8441, and 10,270; and, on deducting from these numbers the whole deaths from fever, there remain for other diseases 6786, 7600, and 8090; so that, contrary to the common notion, the same causes which have increased so much the devastations from fever, have actually also increased the casualties from other diseases at large.

It was stated under a previous section, that the *duration* of fever varies exceedingly, from a few days to several weeks; that inflammatory fever is often resolved abruptly between the fourth and ninth days, leaving nothing to be recovered from except debility and emaciation; and that typhus and synochus, on the contrary, commonly continue between eleven and one and twenty days without abatement, but sometimes for a much longer period, nay, even for twice the longest of these intervals. That interval too may be prolonged by local disorders supervening. In the mixed epidemic of 1817-20 it appears from the tables of Dr. Welsh, that the average duration of fever between seizure and the establishment of convalescence was 12⅓ days; but in the late typhoid epidemic the time must be somewhat greater.

Convalescence in general proceeds more slowly in fever than in other diseases requiring similar treatment — probably because fever, by virtue of its two essential constituents, reaction of the circulation and nervous exhaustion, leads to more general disturbance and more extensive derangement of most of the animal functions. According to Dr. Welsh the average stay of fever patients in hospital in the inflammatory epidemic of 1817-20, was very nearly twenty days; and the average duration of the disease at entrance was seven days; so that four weeks may be taken for the period when patients are able to take care of themselves. According to Dr. Cowan the average stay in hospital in the more typhoid epidemic of Glasgow in 1836 was eighteen days. This will give nearly the same ultimate result with the calculations of Dr. Welsh; because, in consequence of the more insidious mode in which synochus and typhus have commenced in late epidemics, patients do not generally arrive in hospitals so early in the disease. Four weeks, however, by no means constitute

the full amount of the duration of sickness, as estimated by the time the patient is absent from his usual occupations. Dr. Cowan considers six weeks a low average for expressing this fact; and, from observation in the instances of medical students, where the whole circumstances may be accurately ascertained, it is probable that the real average is not less than two months.

Anatomical characters of Continued Fever. The pathological anatomy of continued fever remained, till lately, in a very crude and unsatisfactory condition. But no other topic has attracted so much attention during the last five and twenty years, or has been investigated with more success, so far as the accumulation of facts goes. Whether the result has been hitherto beneficial in reference either to pathological doctrine or medical practice, is a question which admits of some doubt. A very great variety of morbid appearances have been indicated as occurring in fever. Of these many are plainly incidental, because they do not by any means present themselves regularly. Others, however, have been held to be invariable; and consequently authors have sought for the nature and essence of fever in the local morbid action which gives rise to such appearances. On taking into account the general result of the observations of all pathologists of credit, it seems impossible to avoid the conclusions, that no morbid appearance is invariable except congestion of internal organs; that every other pathological fact which has been observed is not constant, and is therefore the effect of a secondary disease; and that, in all the observations hitherto made on the pathological anatomy of fever, we must be content with discovering its consequences, not its causes. The information which has been amassed is important in a practical point of view, as turning the attention of practitioners to the necessity of studying and treating those secondary affections which in various circumstances are the occasion of suffering, danger, or death. But it does not seem to throw much light on the real essence of fever; and, by being rashly assumed to furnish that light, it has led to grave theoretical and practical errors.

In the first place there can be no question that cases of death from true continued fever, of the typhoid or synochus type, occasionally present themselves where no morbid appearance whatever is detected, except congestion of internal organs. In such cases it is usual to find the sinuses of the dura mater somewhat turgid with blood; the bloodvessels of the membranes of the brain more or less gorged, sometimes considerably so, and the substance of the brain unusually chequered with bloody points when cut across; the bronchial membrane of the lungs dark and vascular; the intestines also vascular, and the vessels well-marked in consequence of being distended with dark blood; the gastro-intestinal mucous membrane spotted here and there with small points of ecchymosis, and in the depending parts with large brownish-red plates of extravasation into its substance, or rather into the submucous cellular tissue; the mucous membrane of the bladder similarly affected; and generally, too, the external surface of the body unusually discoloured by lividity, especially in the depending parts. In addition to these indications of vascular congestion, there is very commonly found some effusion of serosity into the ventricles of the brain, and into the subarachnoid cellular tissue, as well as accumulation of serous fluid in the back part of the lungs, together with darkness and brittleness of the injected tissue. That some of these appearances exist during life seems highly probable. The occurrence of congestion of the cerebral membranes is rendered probable by the visibly congested condition of some external parts, such as the skin and conjunctivæ; and condensation of the posterior region of the lungs is often discoverable before death by the stethoscope. Nevertheless, it is material to remark, that all the phenomena now mentioned come also under the denomination of pseudo-morbid appearances, and may be occasioned merely by the particular manner of death, that is, slow failure of the respiration before arrestment of the circulation, or by organic processes carried on during the first few hours which succeed the extinction of animal life. Hence much of the vascular congestion and serous effusion seen after death

from primary fever may be, and indeed almost certainly is, pseudo-morbid; at all events equal congestion and effusion are frequently remarked after death from other causes, where there was clearly no affection during life, either of the brain, the lungs, or the intestinal canal. The last remark applies particularly to the congestion of vessels and effusion of serosity commonly observed within the head — appearances which have been imagined by one sect of non-essentialists to bear out their doctrine, that fever consists radically of cerebral inflammation. It also applies with equal force to the vascularity and submucous extravasation observed often in the stomach and intestines — to which single appearance the Broussaists are not unfrequently reduced, for evidence of their imaginary gastro-enteritis.

The morbid appearances which occur incidentally, or as secondary affections, during fever, are chiefly either the several effects of inflammation of the internal organs, or softening and friability of their texture from an unascertained cause. The frequency of secondary appearances must be stated very differently, according as we admit dothinenteritis to be a mere variety of ordinary fever with a secondary disorder of the intestinal canal, or maintain that it is a distinct disease. If that affection be excluded, the secondary appearances observed in the dead body are few and simple. In the fever of Edinburgh for example, where inflammation and suppuration of the intestinal muciparous glands are rare, other morbid appearances are also on the whole not frequent. If however the abdominal disorder in question be regarded, not as a distinct disease but as incidental to typhus, the number of pathological appearances, which must be included under the class of secondary phenomena, becomes very great; because that particular disorder never makes its appearance without being attended by very many others, secondary to itself, and involving important structural derangements. In treating of continued fever hitherto, dothinenteritis has been considered one of its secondary disorders. It will, therefore, be right to follow out the same doctrine in the present place, and to enumerate all the pathological appearances which have been indicated in fever, with this understanding of the meaning of the term.

The *brain* and *membranes* seldom present any other deviations from the healthy condition than those already enumerated. Sometimes vascularity and effusion of serosity are attended with opacity of the arachnoid. This opacity is conceived by many to be a character of inflammation, but probably without sufficient reason. A more unequivocal character, but an extremely rare fact in the pathology of fever, is effusion of distinct lymph on the surface of the arachnoid. It is usual to find authors speaking in general terms of inflammation being seen in the cerebral membranes. By inflammation, however, they generally understand vascularity and turgescence only. Now these appearances are altogether fallacious diagnostics of inflammation. Mere vascularity of the cerebral membranes can scarce be satisfactorily referred to inflammation, unless there is an extreme abundance and minute network of visible vessels occupying the superior as well as inferior parts in point of position, attended with an uniform pale rose or flesh-coloured blush, and by no means necessarily accompanied, indeed rather without, turgescence of the larger bloodvessels. These are the anatomical characters of cases of idiopathic meningitis fatal in its early stage; but such characters are very rarely presented by the congestive vascularity often observed as the only unnatural condition of the membranes of the brain after fever.

The part in which morbid appearances are most frequently found is the mucous membrane of the alimentary canal. The *pharynx* exhibits sometimes superficial ulcers, more rarely suppuration and abscess of the submucous cellular tissue. M. Louis found the former appearance in one sixth of his cases. The *gullet* is likewise often superficially ulcerated — a very rare observation in other diseases at large. The *stomach* is sometimes enlarged; softening, with attenuation, of the villous coat is common, having been found in a third part of Louis's cases; ulceration, marked by a sharp eroded border, is more rare;

mammillated roughness very frequent; and each of these states is often attended with greyness, bluishness, or redness, of the surface, which may also occur as the sole unnatural appearance. These anatomical characters, which Broussais thought to be invariable, are very frequently altogether absent, in the fevers of this country; and M. Louis has given his valuable testimony to their not unfrequent absence even in what he considers the only true typhoid fever of France, the dothinenteritis of Bretonneau. The *duodenal* mucous membrane is at times red, softened, or even superficially ulcerated. The remaining *small intestines* are usually distended with gases, and contain a good deal of mucus, sometimes sanguinolent, more frequently bilious. Their mucous coat is white in cases quickly fatal, red at a later stage, grey in old cases, and frequently softened; but by far the most remarkable, and also (taking fever in the generic sense as comprising continued fever of all countries), their most frequent morbid condition is inflammation of the solitary and conglomerate glands, which are scattered over the course of the small intestines, and which especially abound near the ileo-cæcal valve. The early stage of this organic affection consists of redness, thickening, and softening of the glands, with sometimes a deposition of friable matter in the adjacent submucous tissue. Afterwards the surface becomes bluish-grey or ulcerated; and at a later period the ulcers are found to have spread, and sometimes put on a ragged, fungoid margin. Frequently a depression is seen, and over it a fine transparent pellicle, presenting the appearance of an ulcer which had healed. The isolated glands of Brunner are more rarely affected than the conglomerate glands of Peyer. Sometimes a perforation is seen at the bottom of an ulcer, together with the usual characters of peritoneal inflammation. The greatest amount of disease is commonly found near the ileo-cæcal valve; and, in most cases, it is confined to the lower eighteen inches of the ileum. Ulceration is seldom observed, unless life has been prolonged beyond the fifteenth day of fever. The *colon*, is for the most part distended with gases, like the small intestines, and presents the same variety of structural derangements. In particular, the mucous cysts are frequently enlarged; and ulceration is so common, according to Louis, as to be observed in a third part of the cases.

The *serous membranes* seldom present distinct signs of disease. Serous effusion into the cavities, it is true, seems not uncommon; but the amount is inconsiderable, and such as may well arise from pseudo-morbid operations. Louis met very rarely with either pleurisy or pericarditis; and this is consistent with the observation of British physicians. Peritoneal inflammation is sometimes presented in the shape of redness and opacity of the peritoneum, lymph spread over it, and sero-purulent matter in its sac; but this condition is extremely rare, except in consequence of perforation of the intestines by an ulcer from within.

The *glandular system* is frequently affected. The subcutaneous lymphatic glands sometimes present induration and enlargement, and most frequently in the neck and axilla. These bodies however are, on the whole, seldom materially diseased, comparatively with the lacteal and lymphatic glands of the abdomen. The lymphatic glands of the stomach are at times enlarged, as also occasionally those which lie adjacent to the biliary ducts. The mesenteric glands are always more or less affected, wherever the mucous glands of the intestines suffer. The earliest marks of disease are some enlargement, or friability, and pale redness; at a more advanced stage there is greater enlargement and dark redness; and at length, in the most advanced cases, the glands are filled with pus. The mesocolic glands are subject to the same pathological alterations. Sometimes both the mesenteric and mesocolic glands are diseased, where the intestinal mucous glands are healthy.

Of the *great viscera* the spleen is very generally found much softened, of a dark bluish-black colour, and much enlarged. The liver is more rarely enlarged, softened, and friable, with unusually fluid bile, and at times redness of the lining membrane of the gall-bladder. The kidneys are at times softer and

darker than usual, and the bladder red internally. The heart is often dark, dry, and softened, occasionally to such a degree as to be easily torn, and to retain like dough the impression of the fingers; its cavities contain usually little blood, and, whenever its parietes are softened, the blood is in loose clots, without separation of fibrin or fluid, and mixed with air-bubbles. This condition of the heart always corresponds with a hurried, feeble, fluttering pulse during life. The lungs are frequently quite healthy, sometimes partially gorged with red serum, or partially hepatised; the bronchial tubes usually contain a good deal of mucous fluid, and are dark-red in colour; and the epiglottis, glottis, and larynx, occasionally show redness and thickening of their lining membrane, but very rarely erosion or ulceration.

The secondary morbid appearances, of which the preceding narrative presents a succinct list, are derived principally from the able pathological directions of M. Louis, who is universally acknowledged to have given the best view of the pathological anatomy of the disease as it occurs in Paris. His account corresponds closely with the descriptions lately given of that variety of the London typhus, which is complicated with affections of the bowels, and which will be found fully described in the writings of Drs. Bright, Tweedie, and Burne.

The multifarious appearances of organic derangement thus indicated are, however, by no means common to all fevers, or even to all forms of typhus. On the contrary, very many instances of true typhus are to be met with even in London, where no marked morbid alteration of structure is to be seen at all, further than the signs of congestion or of immaterial serous effusion. As to the fever which has prevailed in Edinburgh for twenty years past, and in which serious bowel affections are in general very uncommon, it is certainly rare to witness any of the more prominent appearances so frequently seen by M. Louis and his countrymen. Even where signs of local disturbance of function existed during life, it is rare to observe distinct structural changes after death; turgescence of vessels, and serous effusions to a limited extent are the only general appearances; an unusual accumulation of mucus in the bronchial tubes is not uncommon; and, in a few instances, redness and effusion of lymph have been observed on the pleura. In particular, it is rare to find any unnatural condition of the intestinal mucous membrane, so constantly observed in France; frequently the entire tract of the alimentary canal is quite healthy; and the only appearances at all familiar, are various forms of redness, sometimes with softening, grey discoloration, and attenuation. The various remarkable appearances of softening of the viscera, indicated by M. Louis as of frequent occurrence, are here extremely rare. It seems reasonable to conclude, that the signs of structural derangement, ascribed by M. Louis to typhoid fever generally, are most of them peculiar pathological states, secondary not to fever in general, but to one of its secondary disorders — inflammation of the mucous glands of the intestines.

The most interesting of these structural derangements is undoubtedly the softening, which is invariably observed in one or more of the great viscera in all cases where life is prolonged for a moderate number of days. It is a secondary or consecutive affection, is seldom observed until the intestinal disorder has had time to develop itself fully, and is most marked in the cases where that disorder has advanced to suppuration and ulceration. Its precise nature is not ascertained; but M. Louis is convinced it has no connection with inflammation of the structures it invades; for indeed the organ which presents it, is generally softened throughout and equably, and does not show any one of the familiar pathological characters of inflammation in other circumstances. It is the frequent cause of death, especially when it invades the heart; and the symptoms it produces are those of extreme depression of the circulation, and typhoid exhaustion.

Causes of Continued Fever. One of the most melancholy proofs of the uncertainty of medical doctrine, is the doubt still entertained by many estimable members of the profession respecting the causes of fever. Opportunities of

investigation have for many centuries abounded to a greater extent, perhaps, than upon any other question in medical science; the most eminent authorities in medicine have employed these opportunities with zeal and acuteness; and nevertheless, in the most enlightened parts of Europe, a division of opinion prevails on some most essential departments of the subject. But, after all, this division of sentiment arises as much from the different conformation of the human mind, as from any obscurity or contrariety of the facts. The peculiar sentiments of some have indeed been formed from peculiar opportunities of observation, from the observation of anomalies, which they have incorrectly regarded as the general rule. Yet it must be admitted, that the greater proportion of the discrepant doctrines of the present day, as to the origin of fever, are founded essentially upon the same great body of facts.

While these discrepancies must be admitted and deplored, it does not appear that they are altogether so important or so discreditable to the reputation of physic as its maligners will insist. For the opinions of the great majority of scientific physicians are in accord on most of the essential points of doctrine; and the deviations occasionally observed should be regarded as in no respect different from the occasional dissents which take place every day in the conclusions formed by juries on questions of common life, which to most minds seem free of all ambiguity.

The great questions involved in the investigation into the causes of continued fever are three in number:—Does the disease originate in infection? Does it originate in other causes? Granting that it does originate in other causes, may such fevers propagate themselves by infection? These questions will be considered in the order here laid down. It will be seen that they cannot be all answered by any means with equal confidence.

Infection of Fever. By far the most important question relative to the causes of fever regards its origin in infection, or contagion. As these terms are used in various senses, it may be well to observe, that, in the following remarks, contagion will be used in the sense of communication by contact, and infection in that of communication by the medium of effluvia or atmospheric poison. But indeed the former term may be discarded at once from the inquiry, with the simple statement that there is not a vestige of evidence to prove that actual contact is necessary for the transmission of any one febrile disease from the sick to the healthy,—least of all, certainly, for the transmission of continued fever. Nor is it easy to see how any thing like certainty, or even a strong presumption, is to be attained to on such a question. Science would gain by the abandonment or limitation of both terms now in use, and by the adoption of the generic term "communication," to denote the mere passage of disease from the sick to the healthy, without involving at all the question, in what way the passage is accomplished.

In the British Islands probably not above one physician in fifty entertains any doubt of the infectious nature of continued fever. In France, and also in Germany, on the contrary, the opposite doctrine is at the present time prevalently adopted, though not by so preponderating a majority. It would be desirable to fix, if possible, the causes of so singular a discrepancy of sentiment, and to find out whether the disease really differs in its characters, or the difference lies only in the disposition of men's minds. But such an inquiry would lead to a long argument, which would be misplaced in a work like the present. It must suffice then to set out with stating the general proposition, that the British doctrine seems well-founded in respect of the fever which prevails in Britain and Ireland, and to attempt establishing this doctrine by irrefragable facts.

Great advantage will be derived from conducting this inquiry with reference to bodies of men, rather than to solitary cases, on which the supporters of the doctrine of communication have been often too prone to rest their cause. Individual cases, however conclusive to appearance, are open to many sources of fallacy, which it is impossible to guard against so thoroughly as to avoid

the risk of error,—much less to overcome the hesitation of over-cautious or reluctant understandings. Facts derived from groups of cases come with a force which no reasonable mind, however sceptical, can honestly resist. The arguments to be stated upon this principle will be drawn chiefly from direct personal observation of the fever of Edinburgh for many years past. Equally pointed facts might be obtained from the history of epidemics of fever in other large towns. But perhaps they have never been ascertained with such precision, or under circumstances so favourable for securing their conclusiveness, as in Edinburgh during the twenty years subsequent to the first great eruption of fever in 1817.

The first argument in favour of infection may be found in a general survey of the history of fever in a district for a considerable term of years. In the rural part of the district it is seen to be always comparatively rare, and scarcely ever, properly speaking, epidemic; while in large towns it is never entirely absent, and often puts on the form of a wide-spread pestilence, which extends its ravages wherever human beings are most crowded together, and most exposed to breathe a confined atmosphere. When it becomes epidemic in a large town, it never bursts forth with impetuosity, like diseases of undoubted miasmatic origin; but extends gradually, and always the more slowly the larger the city, so that many months may elapse before it reaches its full height. In this condition it remains only for a limited time, the length of which is proportioned to the size of the city, and governed by the circumstance, that a certain moderate proportion of a population is at any one time susceptible of infection, so that the disease must at length exhaust the constitutions liable to invasion. It consequently then begins to decline, retires as gradually as it commenced, and finally resumes its natural condition, affecting only a few individuals here and there, and at distant intervals. A calm succeeds, and fever is almost forgotten. But in a few years its favourite haunts are occupied by a fresh population, with many susceptible constitutions. Under favour of cooperating circumstances it again emerges from obscurity to resume its epidemic devastations, and passes a second time through the same cycle of changes, and commonly in the same interval of time. In these successive revolutions no connection can be traced with season, temperature, moisture, winds, barometric pressure, or any appreciable atmospheric condition. This general history, even excluding details, appears irreconcilable with any other supposition, except that the disease is transmitted by communication from the sick to the healthy.

But secondly, on entering into the details of a particular epidemic, new arguments of great weight may be obtained from the general history of its progress. Thus fever is found to spread at first, not by scattered unconnected cases occurring at a distance from one another, but by slow degrees around one or more invaded localities as *foci*, — first creeping from one individual to another in a family, then from family to family according to their proximity relationship, or general intercourse, and at length to the surrounding population promiscuously, with the exception of the better ranks. It may often be difficult to trace out these facts with accuracy, partly on account of the great length of time the infection often lies latent before the disease breaks forth, partly by reason of the apathy of the order of society where chiefly it prevails, and their natural forgetfulness of what is passing even in their immediate vicinity. But at the beginning of an epidemic, before the question is complicated by the establishment of secondary foci for the disease, it may be always ascertained, with proper pains, to spread gradually to the neighbourhood of the sick in the first instance.

But a farther argument of very great weight may be drawn even from the very violations of this general rule. For sometimes the disease is seen suddenly to arise, and gradually to spread, in parts of a town where it had not previously existed; and this in concurrence with the arrival of the disease by importation from a previously invaded locality. It may indeed be objected,

that the new eruption of the disease is merely an accidental coincidence with the communication which has been held with the invaded locality, and not its real consequence; that this constitutes nothing more than one of the solitary or individual facts, which were admitted above to be fallacious. But then there are instances where, after direct simultaneous communication with the disease in an invaded locality, several new foci are established at one and the same time; — a concurrence which can scarcely be supposed to be the result of accidental coincidence, because, according to the doctrine of chances, it is in the highest degree improbable. Or, instead of several simultaneous foci being formed by the communication of several individuals at the same time with the disease at a distance, there may be several established consecutively in new and remote localities by the same individual, passing from place to place while ill of fever—a conjunction of circumstances which is not less improbable as the result of accident merely. Pointed facts of both these kinds have been selected by Dr. Alison (*Edin. Med. Journ.*, xxviii. 233.), and might be encountered much more frequently towards the commencement of an epidemic, if observers were to carry on their investigations with a more thorough knowledge of the nature of evidence than is usually brought to the inquiry.

A fourth argument, more powerful perhaps than any other, and upon which alone the doctrine of the communicability of fever might be rested, is, that in circumscribed localities inhabited by crowded bodies of men, fever is observed invariably to spread among the healthy, when it is introduced to a great extent from without, but never materially at any other time. This is a general mode of expressing the history of such institutions as infirmaries and fever hospitals. During the last twenty years the Infirmary of Edinburgh has been made the receptacle of a large proportion of fever cases in three epidemics, which have lasted between three and four years; and there have been two intervals, varying from three to five years in duration. During the intervals when fever cases from without were few, fevers originating within the hospital were extremely rare among any classes of individuals attached to its service. But during the prevalence of the several epidemics, fever abounded in every department of its service: physicians, clinical clerks, general servants, nurses, washerwomen, apothecary's assistants, all suffered more or less, and some to an excessive degree. The same facts were observed even more remarkably in an institution, which was during the same interval occasionally occupied as a fever hospital. In three epidemics it was made use of for this purpose; and, at various periods during the last twenty-five years, it has also been occupied, when fever did not prevail epidemically in the city, by crowded bodies of men, first by soldiers as a barrack, then as a retreat for some hundreds of poor people who were turned out of their houses in the winter by an extensive fire, next as a quarantine house during the prevalence of cholera, and, for some years past during the worst epidemic of fever which has yet prevailed in the city, it has been occupied by about 300 of the very lowest of the community, namely, as a house of refuge for vagrants and other destitute persons. Now, on each occasion when it was occupied as a fever hospital, the people on service in the institution suffered to an extraordinary degree, scarcely a single individual escaping an attack who remained a moderate length of time in it. But, on other occasions, fever was either absolutely unknown, or the cases were rare and distant, and easily referrible to the particular manner of life of the individuals composing the population of the establishment. It is also worthy of notice, in reference to both chains of facts here mentioned, that neither around the infirmary, nor around the late fever hospital, did fever ever prevail to any material extent during any of its epidemic visitations. These remarkable facts seem to set at rest the question which has been agitated by some bigotted non-contagionists, Whether the prevalence of fever in such circumstances may not be owing to some very peculiar circumscribed miasma? For here the local miasma must be held to

be circumscribed by the very foundation-walls of the buildings, to affect those buildings alone of the numerous institutions of a similar kind throughout Edinburgh; to be developed by fortuitous coincidence on three or four successive occasions, when fever patients happened to be brought in numbers into them; and to be cleared away by the same incomprehensible accident on repeated occasions, exactly when fever cases ceased to be accumulated from without. How any individual in the possession of understanding, and aware of the import of evidence, can resist such proofs as these, and continue to deny that fever is communicable, appears utterly incomprehensible, unless he call in question the special facts? These, however, are familiar to hundreds. It would be out of place to detail them numerically here; but a part of them may be seen in the statistical form in the paper of Dr. Alison already quoted.

The fifth and last argument, and one little inferior in force to that just laid down, is, that in hospitals where fever patients abound, the proportion of attacks among the people on service is in the ratio of their exposure to the emanations from the sick. Nurses are most exposed, and accordingly suffer most; in Edinburgh not a single fever nurse escapes who remains long enough at her post. In 1818 Dr. Welsh, then superintendent of the Fever Hospital, found that of thirty-eight nurses all were attacked except two or three, who had been but a short time in the institution (*On Bloodletting in Fever*, p. 45.)—a statement which the writer is able to confirm, having at the time been a resident clerk. Next in order came the resident clerks or house-surgeons, who have charge of fever cases, and whose peculiar risk consists in their duties calling them to make minute personal examinations of the patients at all times, but especially on their first admission, and generally to spend much time in the atmosphere of fever wards. Accordingly few of them escape fever long. Of fifteen gentlemen, who held between 1817 and 1820 the offices of house-surgeon, or resident clerk, in the Edinburgh Infirmary and Fever Hospital, two only escaped an attack; and during seventeen months of the period, when the epidemic was at its height, there occurred sixteen cases of fever among ten of these, of whom five had it once, four twice, and one thrice. The third rank in point of exposure may be assigned to dressers and house-servants, who, according to the practice pursued in Edinburgh, are not much in communication with fever patients, but who, when this does occur, communicate with them closely. The proportion of seizures in this class is much less than in the two former, but still quite sufficient to attract observation, as distinguishing them from those whose exposure is still less. The precise number it is unfortunately impossible to ascertain. The next place may be assigned to the medical students of hospitals, not attached to the service of the institution. Here the exposure is for the most part insignificant, because few general students examine the cases of fever with minuteness: accordingly few suffer. In the early epidemic of 1817-20 in Edinburgh, when the resident clerks suffered so severely, fever was absolutely unknown among the general class of hospital pupils, because at that time the disease was new as an epidemic, and held in wholesome dread; so that the physicians of the infirmary were commonly deserted in their rounds, when they arrived at the doors of the fever wards. Now, however, fever is a more familiar visitor; the fever wards and fever patients are approached by most without hesitation, and by some the cases are examined with care and minuteness. Accordingly a few instances of fever are every now and then presenting themselves in the present class, but nevertheless far fewer proportionally than in any other denomination of persons yet mentioned. In the winter of 1836-7, among sixteen gentlemen in charge of the general and fever patients of the university clinic, there occurred nine cases of fever; while among their fellow-students of clinical medicine, 140 in number, who had no particular charge, there were only four attacks. In conclusion, and in contrast to all these circumstances, may be taken the condition of other bodies similarly

situated in every other respect, except that they are not exposed at all to the concentrated fevers of a hospital. And, to avoid all ambiguity, let the attention be confined to such as occupy the same station of life, and follow the same pursuits with those who have been seen to be so very liable to fever under exposure, namely, to medical pupils not in attendance upon any hospital where fever cases are collected together. Here the chain of evidence is found to constitute an uninterrupted succession of links. In 1817-20, when the disease prevailed so extensively among the few medical pupils attached to the service of the hospitals, it was wholly unknown among seven or eight hundred medical students, who did not come in contact with fever; and in 1836-7, when it occurred severely among clinical clerks, and to a slight degree among the general clinical pupils, on the most careful inquiry it was ascertained, that among 500 or 550 medical pupils, not clinical, only two cases had occurred in six months, both of whom were much in contact with fever in the houses of the poor in the capacity of pupils to a public dispensary.

Little doubt can exist, that the history of other hospitals and other schools might furnish similar facts equally interesting, and not less conclusive. But there are circumstances in regard to the institutions of Edinburgh which it is needless to dwell upon, and which tend to place the evidence of such general facts in a very strong and unequivocal light. Other general facts of the same nature might be drawn from the experience of the Edinburgh hospitals. It may be sufficient to mention two only. It has been invariably remarked, that the admission of a few fever cases into a general ward is attended with little or no risk of the fever passing to the other inmates of these wards. But so soon as the cases exceed considerably a third of the whole, then the fever begins to show itself among the domestic attendants, and to appear among the other patients. And if a convalescent from some other febrile disease is allowed to remain in a fever ward, he is attacked with fever almost invariably. The only other general fact of the same purport requiring mention is, that in a pure fever hospital extremely few of the inmates of any denomination escape. This fact has been adverted to in a former statement.

Laws of Infection. The communicability of fever from the sick to the healthy being thus put beyond all possibility of question, it becomes an object of great consequence to determine the rules by which its communication is governed. A good deal of vague statement has been published on this subject; and the *laws of contagion*, as they have been boldly designated, have been promulgated with considerable confidence. Much fallacy and error, however, have crept into the inquiry towards determining these rules, partly because too much reliance has been placed on conclusions drawn from solitary facts occurring in the instance of single individuals, and partly because various communicable or infectious diseases have been mingled together in the investigation. Confining the attention to continued fever, as it appears in the British Isles, the following general propositions seem well-established: —

1. All the forms of primary continued fever are communicable, and probably in an equal degree. It is generally thought that synocha, or pure inflammatory fever, is an exception; and even some unhesitating contagionists incline to this opinion. Such certainly seems to be the case in hot climates; and such seems probably also the fact with the ephemeral synocha of temperate countries. But there can be no manner of doubt, that the inflammatory fever described above, as prevailing with synochus and typhus in the epidemic form, is capable of being transmitted from the sick to the healthy. It was seen to do so unequivocally in Edinburgh between 1817 and 1827, when it was at different times prevalent, one type of fever seeming to produce all types indiscriminately. In a considerable proportion of the resident clerks of the hospitals the disease assumed the pure inflammatory form; and the same fact was also observed, though not to so great a degree, in the instance of young adults generally.

2. Very great differences exist between different individuals, as to their liability to fever under exposure to it. Some are seized soon after slight exposure, others only after several months of close communication with the sick, and a few seem proof against infection altogether. The experience of fever hospitals however, in epidemic seasons, renders it probable, that the immunity apparently enjoyed by some is only relative, and not absolute; for it has been seen above, that in a fever hospital during an epidemic every individual without exception is seized, sooner or later, who remains long in the establishment. Continued fever, therefore, is probably communicable to all constitutions.

3. The infection of continued fever is for the most part by no means virulent. This is contrary to universal prejudice among unprofessional persons, and to the opinion entertained even by some members of the medical profession. But it is nevertheless certain,— so far as minute observation of several violent epidemics during the last twenty years can determine the point, — that moderate precautions will render the infectious atmosphere inert. Cleanliness and ventilation will speedily extinguish any epidemic. For it is well-ascertained, that fever communicated to an individual in the better ranks by attendance on the sick in hospital is very rarely propagated in his own station, or to any of his attendants. Among numerous instances known to the writer, of young practitioners and medical students who have caught fever in the prosecution of their practical studies, not a single case has occurred where the disease was communicated in their families at home or in their lodging-houses.

4. On the other hand, infection operates with very great certainty wherever cleanliness and ventilation are neglected. Hence the ravages it commits among the poor. Hence, especially, the extraordinary devastations it commits among the low lodging-houses of great towns. Even in the better ranks of society, the same cooperating causes will make it spread. In an instance where the disease was introduced into a family in good circumstances, the mistress of which was slovenly and a fatalist in her notions, no fewer than seven children were attacked in succession in the course of six weeks.

5. One attack of fever is in some measure a protection against subsequent communication of the disease. An erroneous notion has prevailed, that one attack is a complete defence ever afterwards; but numberless facts prove the contrary. The history of fever hospitals shows, that the same individuals are frequently attacked in more than one epidemic, or even twice in the same epidemic; fever nurses very often have the disease twice at least: the writer of this article has had it six times while attending the fever wards of the infirmary or fever hospital; and Dr. Tweedie, physician to the London Fever Hospital, has had it three times. Nevertheless, a majority of those who have one decided attack referrible to infection are not liable to suffer afterwards; and the protective influence of the first attack is even shown in some measure in the instances of those who do suffer a second time, by the longer exposure, which seems always necessary for the infection to take effect.

6. Fever is usually communicated by long exposure to the emanations from the sick, and seldom by any single short exposure however decided. This general law seems to follow as a corollary from what was stated in the third section. It is a common notion that single, brief, decided, exposures often occasion an attack; and, in support of this notion, reference is made to cases where individuals can trace the infection, as they imagine, to a particular fever patient, by having experienced some very peculiar morbid sensation at the time of exposure. There is much room for fallacy, however, in observations of this kind; and, besides, their proportion is small, compared with the far more numerous instances where no such sensations can be recalled as having ever been experienced. That communication in this way must be extremely rare, is evident from unequivocal facts; for, if short decided exposures could readily produce fever, how happens it that the disease is so

very seldom propagated among the attendants of medical students and others of the better ranks who labour under it? That the infection is communicated rather by frequent and long imbibition of the poison, will farther appear from the manner in which a previous attack confers partial protection subsequently. The common interval in the case of clinical clerks and nurses, between taking charge of fever patients for the first time and the breaking out of the disease, is three or four weeks. In the instance of a second attack the interval is about as many months, as if simply a longer draught and larger quantity of the poison had become necessary for the development of its influence. It seems probable, indeed, that a second attack of true infectious fever scarcely ever takes place, except under repeated and long-continued exposure.

7. It is not improbable that, on an average, the severity of the disease bears some proportion to the amount of exposure. This point cannot easily be settled with any precision. But the affirmative is rendered a reasonable presumption by the fact, that hospital nurses, clinical clerks, and others similarly exposed, undergo, with very few exceptions, a much more violent attack than the average.

8. Individuals affected with other febrile and inflammatory diseases are not subject to invasion from exposure to fever so long as their primary disease continues; but this protection ceases on convalescence being established, and probably even gives place to greater susceptibility. Hence patients with eruptive fevers may be safely kept in fever wards until the symptomatic fever subsides; but, when convalescent, they run very great risk of taking fever, if not speedily removed from such exposure.

9. The infection of fever takes effect, on an average, more readily among those who are constitutionally infirm than among the robust. It is a great mistake to suppose, as some do, that robust and sound constitutions are little subject to be invaded by fever, if exposed to its cause. Numberless instances to the contrary may be observed in every epidemic. But that the disease attacks with greater facility those of infirm constitution is sufficiently apparent from the interesting and well-ascertained fact, that, during extensive epidemic visitations, it often seems, as it were, to swallow up other diseases. The general patients of hospitals in large towns become generally fewer in number, simply because those, who in other circumstances would have suffered from disease at large, escape that fate by swelling the list of the epidemic devastations.

10. The infection of fever diminishes in effect as life advances. This general fact is universally admitted. It may be beautifully illustrated from the data supplied by Dr. Cowan for the epidemic of Glasgow in 1836. The following table combines the relative population in 1831, and relative fevers admitted into hospitals in 1836, at different ages:—

Age	5 to 10	10 to 15	15 to 20	20 to 30	30 to 40	40 to 50	50 to 60	above 60
Population	25,707	21,211	20,745	38,185	26,419	18,014	11,648	10,220
Fevers	191	318	501	715	309	128	43	11

No correct inference can be drawn from this table in respect of children under fifteen, because the same proportion of the sick poor under that age do not apply for admission into hospitals as at other ages. But, from Dr. Cowan's data above that age, it may be calculated that, if the chance of seizure between fifteen and twenty be supposed to be 100, it becomes between twenty and thirty, in round numbers, 78; between thirty and forty, 49; between forty and fifty, 29; between fifty and sixty, 15; and, above sixty, 4½.

11. The sexes seem equally exposed to receive infection. In the Glasgow epidemic of 1836, among 2260 cases 50·5 per cent. were females, and 49·5 males. In the Edinburgh epidemic of 1819, of nearly 1600 patients 57 per

cent. were females, and 43 per cent. males. The slightly superior liability of the female sex is probably owing to their greater exposure as attendants of the sick.

12. The poison of fever is very apt to take effect under the casual cooperation of cold, fatigue, excesses, and other occasional causes of the febrile inflammations. In many instances fever breaks forth apparently from gradual charging of the constitution under constant exposure to the morbid emanations, and without any other cooperating cause. But in many cases, too, the poison seems to lurk in the constitution for a great length of time, unable to call forth febrile action; till at length some decided exposure to cold, or some great and fatiguing exertion, especially in the way of night-watching, or above all some unlucky excess of the table — any cause in short which occasions either unusual exhaustion or some decided excitement—suddenly lays the system open to the invasion of the hidden adversary, and fever at once breaks forth. Those therefore, who are much in contact with fever patients, can scarcely be too careful in avoiding all sources of great depression and exhaustion of the bodily powers.

13. The ravages of fever are invariably promoted by all circumstances of national or public poverty and distress. Seasons of scarcity, or of sudden diminution of employment for the working-classes, are the sure harbingers of an epidemic visitation of continued fever; and, when these occur during the prevalence of an epidemic, its ravages are always very much extended. A singular illustration of the latter incident occurred in Glasgow, during the late protracted " strike " among the manufacturing population for a rise of wages. In 1837 it was ascertained by the authorities, that, in consequence of the insane proceedings of the workmen, 8000 females alone were thrown out of employment, and became utterly destitute for many months. This happened during the prevalence of an epidemic, already unexampled in that city for extent. Nevertheless, in 1837 its previous ravages were actually doubled; and about 22,000 of the population were attacked, of whom a tenth part perished.

14. Fever is probably apt to extend its devastations with peculiar impetuosity in localities which are damp, or exposed to noisome effluvia, arising from organic matter in a state of decay. This proposition is generally admitted by authors on fever; but more satisfactory evidence seems desirable, before it can be allowed to rank unquestioned among the laws of infection. It has often been observed, that fever rages to an unusual extent, and with peculiar virulence, where the atmosphere is constantly loaded with putrid effluvia; and some experiments on animals would even seem to show, that an affection like fever may be absolutely produced by this cause alone. But many facts of a contrary nature are constantly occurring in the history of epidemics, which clearly prove that the law is by no means universal or even general; and that it probably applies only in the instance of peculiar kinds of effluvia, — which, however, have not yet been ascertained.

15. While a distinct account may thus be given of a variety of circumstances which regulate the prevalence of fever as an epidemic, occasions also nevertheless occur, when the cooperating circumstances are incomprehensible. All the appreciable causes which are believed to promote its extension may be wanting, and still there is an epidemic, which extends, instead of diminishing. Hence physicians have been reduced to the necessity of inferring the existence of hidden atmospheric influences — of some property of the air different from any of its known physical properties, or perhaps compounded of certain states of those properties — by which the propagation of fever is favoured. This cooperating cause is universally allowed to exist. Yet, after all, the expression denoting that cause is really nothing else than a theoretical way of declaring the fact, that something exists, with the nature of which we are unacquainted. It is a mere cloak of convenience for covering ignorance.

16. Much has been written respecting the propagation of fever and other infectious diseases by means of *Fomites*, or substances by which infectious effluvia are absorbed, retained for a length of time, and afterwards given off, with the effect of communicating the disease which produced them. All the investigations, however, yet made on this subject are vague. In regard to fever, it seems probable that fomites do not contribute much to its propagation, and that infection is not retained by them long.

Other causes of Fever. Since continued fever clearly originates often in propagation from the sick to the healthy, it becomes a second question of much interest, whether it originates in any other cause. Authors and practitioners seem in general to be very easily satisfied upon this head, and to have decided the matter in the affirmative; nay, some talk with the utmost familiarity of various special causes, such as cold, fatigue, mental emotions, putrid effluvia, excesses of the table, and the like. But the question of the origin of continued fever in these causes is far from being easily settled to the satisfact on of a philosophical mind.

We know from the experiments of *Magendie*, that when the lower animals are confined in a narrow space, filled with emanations from decaying animal matter, they are attacked and killed by an affection which bears considerable resemblance to the typhus of the human race. A few rare cases have been recorded of a disease, apparently identical with typhus, having broken out in the neighbourhood of places where the dead bodies of animals had been accumulated to a great extent, and buried insufficiently deep. (*Mém. de la Soc. Roy. de Méd.*, i. 97.) In the course of the last and previous centuries, it was believed to have been often observed, that a disease identical with typhus originated spontaneously in the emanations of healthy people accumulated in the loathsome abodes which were then used as prisons throughout Britain. The coast-remittent fever of Africa and other tropical countries seems to differ little in its characters from synochus with a rapid and early stage of typhoid depression. In country districts scattered instances of a fever occasionally occur, which closely resemble an indolent synochus, and which the most careful inquiries cannot refer to communication with individuals ill of a similar disease. In great towns, too, cases of the same nature are met with, during the intervals between epidemics, and in a station of life where epidemic fever, in epidemic seasons of the worst kind, is seldom witnessed. A fever of this description, tedious in its course, characterised by much nervous and muscular depression, without any particular local disturbance, and especially without the marked disorder of the functions of the brain which distinguishes most cases of epidemic typhus and synochus, was so prevalent among the better ranks in certain streets of Edinburgh some years ago, at a time when fever was not prevalent among the working-classes, that a general impression arose among professional people of the existence of some unusual local miasma. A great variety of parallel facts might be referred to, all leading to the general conclusion, that a disease, if not identical with, at all events closely resembling, synochus and typhus as described above, may arise without the possibility of tracing it to communication with the sick. A statement of this kind acquires great weight in the instance of such a visitation of disease as that just alluded to, which prevailed among people in easy circumstances in a great town. We can easily suppose a few scattered cases, occurring in a country district or in a city during an interval of immunity from epidemic fever, which may have originated in exposure to the disease, although the particular exposure cannot be traced. But it is scarcely possible to conceive such a disease prevailing to a considerable extent among the better ranks, who are so remarkably exempt from invasion in the worst epidemic periods,—more especially too as there is next to a certainty, that the infection of fever is seldom virulent, and that a very great majority of seizures with true infectious fever arise, not from a single exposure which might escape observation, but from repeated or long-continued exposure which could scarcely elude notice.

The only condition, then, remaining to enable us to decide in the affirmative the general question, whether fever originates in any other cause but communication with the sick, is, that the disease observed in such circumstances as that just detailed is identical with one or other of the three forms of primary continued fever of infectious origin. On this point there is room for difference of opinion. Many cases of supposed sporadic synocha, synochus, or typhus, are clearly cases of gastric or gastro-intestinal fever, not recognised or admitted as such by the observer. But all cases of the kind cannot be so explained away with candour; unless indeed by holding, as some are inclined to do, that gastric fever may often occur with the local disturbance so obscure, and the constitutional disturbance so predominating, as to render the disease wholly undistinguishable from ordinary epidemic infectious fever. It is also an undoubted fact, that in cases of sporadic fever, occurring either during an epidemic visitation, or during an interval, a physician, extensively conversant with the features of true infectious fever, is commonly able to pronounce, even where the resemblance to the latter disease appears to an ordinary eye very strong, that the sporadic disorder is nevertheless not the same with the epidemic forms of the disease.

The difficulties thus introduced into the present inquiry must be admitted to be formidable. At the same time the general conclusion to be drawn from the whole facts seems to be, that a disease, undistinguishable from true infectious fever, may sometimes arise without infection. Such cases, however, are far less frequent than those clearly infectious in their origin. From a statistical statement made out by Dr. Welsh in 1819 relative to the fever of Edinburgh, it appears, that among 400 cases where the patients assigned a distinct cause for their illness, there were 80 per cent. who were able to refer it to exposure to infection (p. 57.).

On descending from the general question to the more special one, what the other cause or causes of fever may be, the difficulties are greatly increased; indeed they become insurmountable, with such limited and vague facts as are at present possessed on the subject. A long catalogue of causes has been laid down in most works on the practice of medicine, or on fever. But a variety of circumstances render the inquiries regarding them fallacious. Among these, two alone seem sufficient to introduce interminable confusion and uncertainty. In the first place, few inquirers have taken sufficient pains to distinguish primary continued fever from irritative gastric fever. And secondly, the catalogue of causes alluded to is indebted for its length mainly to the non-contagionists, whose testimony may at once be rejected altogether in the matter: for if any individual is unable to see in the arguments formerly adduced sufficient evidence of infection being one cause of fever, how is it possible for him to adduce more satisfactory proofs of the operation of any other cause? How is it possible to admit, that he is capable of weighing evidence dispassionately in any branch of the inquiry? or of proceeding to investigate facts with a calm and unbiassed disposition?

It appears a needless waste of time and labour to attempt any thing farther under this head. Fatigue, mental emotions, atmospheric exposures, noxious effluvia, and excesses of the table, sometimes seem to induce an attack of fever. Often, however, the real cause is the lurking poison of infection, which the incidental source of excitement on the one hand, or of exhaustion on the other, calls forth into action. Frequently, too, the disease produced in other circumstances is an irritative, not a primary, fever. And as for the few instances remaining, where true primary fever appears to originate in one of the above causes, all that need be said farther is, that for one instance where such fever follows such cause, a thousand instances occur where no effect of the kind ensues; and, consequently, that some more essential influence is probably brought into play, than what appears merely on the surface of the investigation.

Whether sporadic cases of true primary fever, originating otherwise than in communication with the sick, are capable of themselves acquiring the property of self-propagation, is another question arising out of the former, which is not less difficult to answer. Unless it can be positively determined, that a particular case is truly sporadic, there is of course an end to all reasoning on the events which follow it. That such cases generally do not spread is unquestionable. But, from what was said above as to the feebleness of infection in ordinary circumstances, this negative fact is no argument whatever, though non-contagionists will have it so, against the possibility of propagation taking place where the conditions are favourable. And in those cases of sporadic fever, which there is an opportunity of investigating with care, it generally happens that the conditions are quite the reverse. The general belief of the profession, and still more of unprofessional persons, is, that all primary fevers without exception, which put on the type of synochus or typhus, are communicable. Although it may be difficult to show that such is the case in regard to true sporadic fevers, the doctrine is sufficiently probable. Meanwhile, this is clearly the safer doctrine to espouse on practical grounds, until the opposite shall be proved; because on the one hand it leads to the employment of ventilation and cleanliness, which are useful accessories in the treatment, and on the other hand it prevents the serious consequences which would result where infection is mistaken for sporadic fever. If we are to admit that the jail fevers of the last and preceding centuries were owing, not to infection, but to the vitiation of the atmosphere, where prisoners had been long pent up in crowds without sufficient renewal of the air, no doubt can be entertained that fevers of spontaneous origin may propagate themselves. But it is impracticable for any one in the present day to satisfy himself that the real origin of such fevers was fully ascertained; and certainly in times somewhat nearer our own, when prisons still continued to be too much the abode of filth, foul air, and misery of every description, fever was seldom found either to get into them, or out of them.

Prognosis of Continued Fever. Prognostication in continued fever is founded partly on the particular type of the disease, and the general character of the reigning epidemic, partly on particular symptoms and groups of symptoms, partly on collateral extraneous circumstances.

Prognosis from the type and epidemic. Of the three types of continued fever synocha is least frequently fatal, typhus most so, and synochus intermediate between the two. The general prognosis will vary accordingly. If it were possible to predict, that a case would turn out one of pure inflammatory fever, recovery might be confidently predicted, at least in the inflammatory fever of this country, and where no signs of severe local inflammation are present. Such accuracy of diagnosis and prediction, however, is very seldom possible. The more purely inflammatory the early stage of synochus is, and the longer its secondary stage is postponed, the more favourable does the prognosis become. So too in typhus, the nearer an approach it makes at the commencement to synochus, the less likely is it to prove fatal.

The prognostication founded upon the type in a particular case may also be qualified by the habitudes of the prevailing epidemic. Since in some epidemics synocha abounds, in others typhus, and in others the mixed type, it is plain that, from the commencement, the probability of recovery must be greatest in the first, least in the second, and intermediate in the third. But it is not in this obvious and direct way alone, that the dominant character of the epidemic influences the mortality, and through it the prognosis. For, on the one hand, it is remarked, that different epidemics of the same type differ in their mortality; and, on the other, it seems well-ascertained, that in epidemics of different dominant types, the mortality among cases of the same type differs, that is, in epidemics where synocha abounds, intercurrent cases of synochus and typhus are observed to be less frequently fatal than cases apparently the same in nature, which occur in epidemics of pure synochus and typhus. And

on the contrary, where typhus is the ruling type, typhus is more deadly, and even synochus more frequently fatal, than the same description of cases in kind and apparent severity, which are met with where the inflammatory character predominates. At all times then it is proper, in forming a prognosis in a particular case, to regard first the particular type, then the frequency of that type in the epidemic, and lastly the general mortality of the epidemic; and the two last circumstances must be regulated by experience on the large scale in hospitals.

Prognosis from symptoms. Prognostics of much importance and considerable precision may be drawn from particular symptoms, or groups of symptoms, or the manner of their commencement and progress.

Where fever commences abruptly with brisk reaction, the probability of a regular stage of reaction is greater than where it begins slowly and insidiously, and the prognosis therefore is in general less favourable in the latter case. If reaction however runs very high, and is not resolved by diaphoretic crisis, but is succeeded by a typhoid state, the prognosis is on the whole proportionally unfavourable, according to the violence of the early reaction, because the typhoid exhaustion bears some ratio to that violence. It is a more unfavourable case where the inflammatory state of the circulation gives place to the typhoid stage in the first week, than where the transition is postponed till the beginning of the second week or later; and the earlier the change occurs in the former instance, the worse is the prognosis. Except in cases of synocha, which often terminate altogether before the end of the second week, an amendment occurring in special symptoms, or in the symptoms generally, towards the middle or termination of the second week, is more favourable than where similar changes occur in the first week. In the latter circumstance the amelioration is often fallacious and temporary; in the former it commonly denotes a crisis. A material temporary amendment on the second day of synochus or typhus is not unfrequent, and often misleads the patient or his attendant. In like manner, an amendment towards evening is a more favourable sign than towards morning. In the latter case it may be merely a remission, which is not at all uncommon in every type of fever; but in the former, especially at or after the middle of the second week, the remission is very frequently the commencement of a crisis. If the case passes the eleventh day and no decidedly unfavourable symptoms take place, nor any general exacerbation, the prognosis becomes more favourable than before; and so too in the same circumstances on the fourteenth day. After the seventeenth however, and still more after the twentieth days, matters are reversed, unless some amendment be observed about those dates: the longer the fever lasts after seventeen days, the more unfavourable is the prognosis.

It is impossible to predict with any confidence the probable result of a case of fever during the early part of the first week, except in so far as a presumption may be formed as to the probable type. Special symptoms, and the degree of severity of the symptoms, are then extremely fallacious. Cases of synochus for example, but above all cases of typhus, may be at this time the mildest, and yet often become afterwards the worst. Frequent rigors, violent headach, irregular distribution of temperature, extreme prostration of strength, much injection of the conjunctivæ, are among the signs which have been indicated as unfavourable, when they occur in the first three or four days particularly. But they are unfavourable, not so much in the way of special signs of danger, as because they constitute together the characters of the type of fever which may be anticipated. It is seldom till towards the close of the first, or beginning of the second week, that the prognosis from special symptoms acquires some stability.

The unfavourable signs deserving attention during the latter half of the first week are great frequency of the pulse (except in synocha), especially in persons towards or after the middle term of life, great softness of the pulse, jarring of the pulse at the extreme of its diastole with easy compressibility, and above all

a weak, fluttering, irregular pulse; a dry, brown, and especially a retracted tongue; irregular temperature of the surface, an eruption of pale diffuse petechiæ, or irregular sweats, with increase of fever after them; much headach, especially in typhus, and above all when united with great flushing of the face and injection of the sclerotics; excessive prostration of strength, shown by the patient lying on his back constantly, and becoming faint on sitting up; delirium of any kind, but especially either high delirium, or muttering delirium amidst a state of stupor, or pleasing delirium with quickness of expression, and a tendency to smiling or *risus sardonicus;* subsultus of the tendons and tremor of the hands; sighing respiration. Several of these symptoms are unpropitious at any time, but they are all peculiarly so if well-marked before the close of the first week; and the earlier they appear, the worse is their indication. It is supposed by some that no fever patient ever recovers whose pulse attains 140° in frequency. This is a complete mistake. In young adults affected with synocha the pulse not unfrequently reaches this elevation, and even exceeds it, without a fatal event; and occasionally, though very rarely, in typhus the same observation is made. Recovery has taken place in the writer's experience where the pulse in typhus was 140, and in synocha at 160.

On the contrary, it may be considered a favourable case of fever, which attains the commencement of the second week without the pulse being very frequent, or increasing much in frequency about that period, without a brown tongue, or irregularity of temperature, or petechiæ, or injection of the sclerotics, or tendency to fainting, or subsultus, tremor, or delirium. And additional favourable signs are a full, rather soft, and not jarring pulse, which does not materially exceed 100 in frequency; the absence of pungent heat; an eruption of small dark circumscribed petechiæ; some drowsiness, capable of being easily interrupted; some desire for food, or the ordinary compound drinks, without urgent thirst; spontaneous change of position, and occasional lying on the side; deafness, and freedom from intolerance of light. In cases of fever assuming in the first week the characters of inflammatory fever, the most favourable of all special signs is the appearance of general perspiration, between the fourth and ninth days inclusive. Before the fourth day sweating is generally partial and without effect on the fever; after the ninth it is rare, and seldom beneficial; but in the interval it is commonly critical. This important criterion, however, must be qualified by the habitudes of the prevailing epidemic; in some epidemics the appearance of general perspiration between the fourth and ninth days of an attack of inflammatory fever is the sure forerunner of its speedy and abrupt departure. In other fevers, but especially in typhus, sweating during this period, instead of being favourable, is often rather the reverse: the febrile state does not subside under it, and usually increases subsequently.

The unfavourable signs in the course of the second week of fever are increasing frequency, feebleness, or jarring of the pulse, especially a pulse higher than 130 or near 140, which, at least in persons towards or above the middle term of life, is with few exceptions a fatal sign in typhus or the more typhoid forms of synochus; a highly loaded, or very dry and retracted state of the tongue, with sordes on the teeth and lips; breathing hurried beyond proportion to the rapidity of the pulse, and still more when interrupted by catches, or intermingled with sighing; a marked tendency to coldness of the extremities, coupled especially with heat of the head and face; great flushing of the countenance, and much dark injection of the sclerotics, especially combined with very contracted pupils, or with a half-shut state of the eye-lids; complete prostration, with a constant supine position, and no attempt to alter it; an eruption of either large or crowded petechiæ, of the pale, diffuse, irregularly circumscribed variety; or a jaundiced colour of the skin; or the appearance of large vibices, either on the parts on which the body rests or elsewhere; or redness and excoriation of the skin where subject to pressure; subsultus of the tendons at the wrist, trembling of the hands, start-

ing of the joints, tremor of the tongue, twitching of the muscles of the face, and above all convulsions, which last symptom is perhaps invariably fatal; excessive watchfulness, or, on the contrary, profound sopor, from which the patient cannot be roused at all, or not without difficulty; or high delirium, with vociferous talking, and tendency to get out of bed, and more especially to violence and furiosity; an anxious expression of countenance combined with much stupor; or, on the contrary, a pleased expression, with watchfulness, and a hurried prompt manner; or Hippocratic collapse; involuntary discharge of urine and fæces; irregular sweats without abatement of fever.

The favourable signs during the second week are chiefly negative, that is, the absence of the preceding symptoms, or their appearance in a mitigated form. The most important are a steady state of the pulse or diminution in its frequency, with increase of fullness, and disappearance of the jerk at the extreme of its diastole; a moist state of the tongue at the edge, with the gradual departure of brownness or foulness, and with increased facility of protruding it; a moderate petechial eruption of the small, dark, circumscribed kind; a placid drowsy expression; occasional sleep, with general drowsiness, little or mild delirium, and facility of being roused; deafness; sensibility to thirst, and some remains of appetite; a change of posture from the supine to the lateral; the supervention of swelling and inflammation of the parotid glands; the absence of excoriation from pressure. The most favourable of all signs are the departure towards the eleventh or fourteenth day of any of the more unpropitious prognostics mentioned above, such as a hurried pulse, dry retracted tongue, vibices, subsultus, tremor, watchfulness, deep sopor, furious delirium, involuntary evacuations, and the like: the non-extension or diminution of erythema from pressure is also a welcome sign; likewise abatement of tympanitic fulness of the abdomen: and a sure combination of favourable prognostics is extension of moisture of the tongue, subsidence of the pulse, supervention of sleep, and return of appetite. One special sign is almost always favourable even where many formidable symptoms are present, namely deafness; and probably the same may be said of a soft, moderately moist condition of the tongue — an occasional, though very rare, accompaniment of the advanced stage of bad forms of typhus.

These are the leading prognostications which may be founded upon the more essential symptoms of fever. Others may be deduced from the symptoms of incidental diseases. Complications on the whole render the result more doubtful; but there are some, to which unnecessary consequence in this respect has been attached, more especially the local inflammations. Local inflammations occurring early in fever, unless they are violent, which is seldom the case, do not in general add materially to the danger, because they are for the most part easily subdued, and without the necessity of exhausting treatment. It is different, however, when they commence in the second week; for every fresh source of irritation or exhaustion is then of importance, and besides, some local inflammations which commence at that time are obstinate, and of themselves fraught with danger.

The worst accessory affections are, great congestion of the brain, if indeed this can be properly regarded as a mere accessory disorder — true pneumonia — the modification of catarrh proper to the advanced stage of bad congestive cases — inflammation of the entero-mesenteric glands, or dothinenteritis — peritonitis — icterus with bilious stools — erysipelas — gangrene and sloughing, especially if they form on several parts. Hence the special indications of the arrival of these secondary diseases, as formerly described under the head of the symptoms, will often give important warnings of danger, and seriously diminish the chance of recovery. Some qualification of this statement however is requisite, in regard to the symptoms of entero-mesenteric disease, and to sloughing. One of the best signs of entero-mesenteric inflammation in its early stage, according to all authors who have taken notice of that affection, is yellow diarrhœa, commonly associated with tympanitic dis-

tension of the belly and deep progressive stupor. But repeated experience in the epidemics of Edinburgh shows, that even all these symptoms may occur without the unfavourable proportion of deaths which ought to ensue, were they characteristic of so serious a local disease; and in particular, that an ochry diarrhœa sometimes appears to keep down or even remove the fever, and is singly not an unfavourable prognostic. As to sloughing of parts subjected to pressure, it is rather remarkable, that, in some epidemics at least, this secondary affection is far from being so unlucky a prognostic as might be anticipated. In epidemics abounding with inflammatory cases, few die who have sloughing, provided they be properly taken care of; and very seldom do they die of the sloughing. If sloughing be confined to the sacrum, and the fever subside at an early period, recovery is rarely prevented in any epidemic by this accessory evil. If the fever go on unabated, or if the local affection break out on several or many parts, the issue is commonly fatal; and almost always so during an epidemic of the typhoid type.

The favourable prognostics deducible from the secondary disorders are few in number. On the whole, the cessation of such disorders is to be welcomed. Yet the departure of the slighter varieties of local inflammation during the first week is of no great moment in itself, and has very seldom any influence on the result of the primary fever. The removal of violent attacks of local inflammation may be regarded as a propitious sign; but the reduction of the strength by the treatment which is rendered necessary should not be lost sight of, as a fresh though indirect source of danger.

Prognosis from collateral circumstances. There are some collateral circumstances which exert a very important influence on the prognosis in fever; among which may be chiefly mentioned age, sex, constitution, either natural or acquired, and the coincidence of cold, fatigue, privation, mental depression, and the like, about the period of invasion of the disease.

The chance of recovery from fever is greatest in childhood and youth, and diminishes rapidly with advancing age after the period of early manhood. Thus in the Edinburgh epidemic of 1818-20, where the mortality was one in 22 for all ages, the deaths under twenty were only one in 65; while between twenty and thirty they were one in 29; between thirty and forty, one in 18; between forty and fifty, one in 11·4; between fifty and sixty, one in 6.* Thus too, in the later Edinburgh epidemic of 1826-7, where the mortality at all ages was one in 9, that for children under fifteen was only one in 41·5; that for youth and early manhood, between the ages of fifteen and thirty, was one in 13·5; that for the middle period of life, between thirty and fifty, was one in 5½; and for people above fifty it was so high as one in 2·5.† In like manner in an epidemic in Glasgow, where the mortality during twelve months subsequent to October 1835 was one in 8·5 for all ages, that for children under fifteen was one in 26; between fifteen and thirty, one in 9·5; between thirty and fifty, one in 4; and above fifty also one in 4.‡ An unaccountable deviation from this rule has been observed in the London Fever Hospital, whence it would appear that the fatality of fever in childhood is equal to that for all ages, or very nearly so. According to one account, that for 1828-9, when the general mortality of the Fever Hospital was one in 7·22, that for children under fifteen was so high as one in 7·33; between fifteen and thirty, one in 9·5; between thirty and fifty, one in 7·33; and above fifty, one in 2·5.§ According to another account, comprising three years subsequent to 1825, when the mortality at all ages was one in 6·82, the proportion below the age of fifteen was one in 11·33; between fifteen and thirty, one in 7; between thirty and fifty, one in 5·5; and above fifty, one in 2·25.‖

* Welsh, on Bloodletting in Fever, p. 129-131.
† Dr. Alison, Edin. Med. Surg. Journ., xxviii. 249.
‡ Dr. Cowan, Vital Statistics of Glasgow, 1838. p. 23.
§ Dr. Tweedie, on Fever.
‖ Dr. S. Smith, on Fever.

The general rule however certainly is, that the chance of recovery is greatly superior to the general average, if the patient does not surpass the age of fifteen or even twenty; and all accounts agree in making the risk to be at least double the general average, when the age exceeds forty.

Sex has also an important influence. According to the tables of Dr. Cowan for Glasgow, founded on the examination of 2259 patients, the deaths for all ages amount to one in 6·75 among the males, and only one in 11·2 among females. The probable cause of this interesting fact is the greater frequency of habits of intoxication in the male sex. At least the difference is scarcely perceptible below puberty, being among 550 patients of both sexes one in 25 for boys, and one in 28 for girls, — a difference which is within the limit of statistical error, for indeed one additional death among the females would reverse the proportion. On the contrary, it becomes very marked after the age of 25, when intemperate habits begin to produce their effects among working people; for among nearly 800 of both sexes above that age the mortality among women is one in 6·33, and among men no less than one in 3·1, or fully more than double. Conclusions precisely similar may be deduced from the tables furnished by Dr. Welsh, relative to a part of the Edinburgh epidemic of 1817-20, where the type was much more inflammatory than in the late Glasgow epidemic. In 743 patients the deaths for all ages were one in 16 for males, one in 30 for females; under twenty years of age the deaths among males were one in 68, and among females one in 68; and above the age of twenty, the mortality among men was one in 11, among women one in 24.

An extraneous circumstance of great consequence, and connected with sex, is the fact of a female being pregnant at the time. Most pregnant women miscarry during an attack of fever; and, when they do miscarry, a large proportion perish. It is impossible to supply numerical data upon this point; but the general rule is commonly admitted. The influence of pregnancy on the prognosis, however, seems to differ in different epidemics; and, contrary to what might be anticipated, the influence seems to be greatest, judging at least from the epidemics of Edinburgh, in those where the inflammatory type prevails, than where typhoid cases predominate.

It is not so easy to calculate numerically the effect of *constitution* on the mortality from fever, as to ascertain that of age or sex; but its influence is acknowledged to be great, — and this both in regard to original and acquired peculiarities. The healthy and robust probably suffer less than the feeble and sickly. This however is by no means easily decided. There can be no doubt of the evil influence of recent severe diseases. For example, convalescents from acute or severe chronic diseases, who take fever in hospitals, have always a violent attack, and a large proportion sink under it. There seems little doubt too, that differences in constitution depending on station in life affect the fatality of fever; for it is generally understood, that fever is more fatal in the better ranks than among the working-classes of a community. There is not any conclusive statistical evidence at present existing for this belief; but the doctrine is conformable with vague general observation, as well as with presumptions founded on the superior excitability of the brain and nervous system in the upper walks of society. It seems not unlikely, however, that an exception should be made in the instance of those epidemics of fever, where synocha abounds and synochus is the dominant type; at least it is extraordinary, how few casualties have occurred among clinical assistants, and other medical students, during such epidemics in Edinburgh. The most powerful modifying influence among constitutional circumstances is, beyond all doubt, that which depends on habits of intemperance. In persons of intemperate habits the symptoms of nervous derangement are always unusually prominent, congestive affections are particularly frequent, especially congestion of the brain, and all the symptoms are less amenable to treatment than in the constitutions of the sober and temperate. Hence the mortality among drunkards is decidedly far greater than the average. The statistical

account already given of the relative mortality among the two sexes after the age at which intemperate habits begin to be acquired, is alone a strong presumption of the truth of this fact; for it is not easy to see in what other way the difference which actually exists is to be accounted for. But besides, every hospital physician knows that the intemperate constitute a very large proportion of the fatal cases. It would be interesting and by no means difficult to ascertain the proportion numerically; but facts for the purpose do not exist at present. Meanwhile, it is worth mentioning, that according to observation of various epidemics in Edinburgh, extremely few drunkards who have attained the age of forty survive an attack of fever. During the clinical courses of five years, prior to November 1837, the writer had only one case of recovery under such circumstances.

The coincidence of exposure to cold, fatigue, general privations, or mental depression, with the invasion of fever, has commonly the effect of rendering the prognosis more unfavourable than it might otherwise be. Cold is apt to complicate the fever with local inflammations, fatigue to aggravate depression, and disturbing mental emotions to increase the nervous derangement and tendency to congestion of the brain. Of these coincidences the worst are mental emotions of the depressing kind.

Treatment of Continued Fever. Few diseases are now better understood than continued fever. Nevertheless the treatment which has been pursued, and to appearance with good effect, is as diversified as may well be imagined. This physician has trusted to general bloodletting, that to local evacuation of blood; one to diaphoretics and sudorifics, another to cathartics; some rely on mercury, some on opium, many on wine, a few on the cold affusion, and not a few upon nature. A cursory survey of these singular discrepancies has led sceptics and the whimsical to deny the value of any treatment beyond a confident reliance in nature's efforts, together with fresh air and the moderate use of laxatives; nor are there wanting practitioners to undervalue the usefulness even of these simple adjuncts. It is extremely difficult to settle the real amount of benefit derived from treatment in fever, by the only mode which can be satisfactory to all, namely, by comparative statistical data. For supposing a sufficiently numerous body of facts were accessible for the purpose of comparison, the statistical method of inquiry, conclusive as it seems to be, and has been thought by many, is really surrounded with as many difficulties and sources of fallacy as any other.

But if the physician, extensively conversant with the treatment of various forms of fever, had it in his power to point out to the wavering in opinion the immediate and most palpable advantages of one method in special cases, and the immediate injury accruing from an opposite method, it is not probable that doubts would be long entertained by any unbiassed understanding; and a faithful inquiry into the causes of the discrepancies in the practice of the best authorities in this department of medicine will lead to the inference, first, that there may be more than one good method of treating the same sort of fever on principles identically the same; and, secondly, that a material difference is rendered necessary in the treatment, by differences in the epidemic character of the disease.

In every other branch of inquiry into the subject of fever, it has been seen that much deference ought to be paid to its epidemic character. In no branch, however, is this precaution more indispensable than in the treatment. No one can call in question that principle, who has been much engaged in the treatment of fever for a moderate term of years. Least of all ought any one to entertain doubts on the subject, who has witnessed the different epidemics which have prevailed in some parts of Britain during the last twenty years. The general conclusion at which he must infallibly arrive is, that the particular type must regulate the treatment in the particular case; and farther, that the prevalence of a particular type must in some measure modify the treatment in all types of a particular epidemic. For example, in epidemics

where synocha abounds, not only are cases often met with whose type requires the use of vigorous antiphlogistics, and even of free general depletion; but likewise in intercurrent cases of synochus and typhus, antiphlogistics, and bloodletting among the rest, are better borne and more frequently required, than during epidemics of the opposite typhoid character.

In endeavouring to fix the treatment in a particular case, or for a particular epidemic, of fever, it should never be forgotten, that there are two opposite conditions of the system which must be combated, excitement of the circulation and nervous depression; that these states always coexist more or less; that their relative degree varies from the first in different cases, and prevalently in different epidemics; and that their absolute, but still more their relative degree, varies much at different stages of the same case. It must further be considered, that besides primary nervous depression, the direct result of the cause of fever operating on the nervous system, there is a secondary depression also, the indirect consequence of preexisting reaction. There is no sound foundation for the opinion of some pathologists, that no other kind of nervous exhaustion but the latter occurs in fever. But its existence and great importance in many cases cannot be denied; nor yet the influence it must have upon the method of cure. Hence it will at once be perceived, that the "indications of cure" in fever must commonly be complex and often contradictory. Violent reaction should be combated first on its own account, and secondly for the secondary exhaustion, which corresponds on the whole with its violence. But in combating reaction, care must be taken not to do so at the cost of seriously increasing direct nervous exhaustion. And on the other hand, while keeping this risk in view, it is right to shun providing too much for present depression, at the risk of augmenting subsequently that which is secondary to reaction. The due consideration of these complicated circumstances ought to leave no difficulty in understanding why so many different and opposite plans of treatment have been proposed, and apparently all with no slight success.

In a practical point of view the most useful and methodical arrangement to follow in discussing the numerous remedies employed in fever, will be to consider the treatment to be enforced at different periods of the disease, adverting at the same time to the influence of type on the several measures. Upon this principle five heads may be advantageously adopted, comprising the treatment at the commencement, in the early stage, in the middle stage, towards the conclusion or final stage, and during convalescence; to which may be added a sketch of the prophylaxis. At the commencement the object of treatment is, if possible, to cut the disease short; in the early stage the principal objects are to mitigate reaction, and still also to cut the disease short; in the middle stage to mitigate reaction, and support exhaustion; in the final stage to support exhaustion and maintain life till the fever wear itself out; in convalescence to restore strength and prevent relapse; and at every period a collateral object often arises,—the removal of secondary local disorders, and of special symptoms.

Treatment of Incipient Fever. It has always been a favourite object with practitioners, to discover a remedy for arresting fever at its outset. The undoubted practicability of suddenly arresting the febrile paroxysm of intermittent on its first outbreak, has probably led to the inquiry, whether as much may not be accomplished for continued fever also. Some have arrived at a favourable conclusion; and it has even occasionally been the fashion to talk with as great freedom of cutting short typhus and synochus, as one would speak of stopping an ague. The general experience of the Profession, however, is unhappily opposed to such views; and especially the experience of those who are best acquainted with the true features of continued fever as presented on the great scale in hospital practice. It is very doubtful whether a true continued fever may be cut short at its outset by any means. Even apparent instances of the kind are rare; and in that case, if we consider how impossible it is in the commencement to distinguish continued fever from ephemera, as well

as from some local inflammations which may be cut short, strong reason will appear for calling the authenticity of the alleged cases in question. Good evidence of the power of remedies to arrest continued fever at its first invasion is to be attained, so far as can be well seen, in one of two ways only,—by the arrestment of the disease in a fair proportion of cases where it is distinctly threatened by the usual signs in persons who have been strongly exposed to infection, and where there is consequently a strong presumption that the attack, if not arrested, will really prove one of true continued fever in the form of synocha, synochus, or typhus;—or by the arrestment of the symptoms of fever in threatened relapse in those cases, which, from the general characters of the epidemic and of the particular type in each case, are of a kind where relapse in the form of true continued fever is probable. But on subjecting to this conclusive ordeal the various remedies which have been extolled for the purpose, it is apprehended, if the writer may judge from his own frequent observation, that every remedy for cutting fever short will be found almost, perhaps altogether, ineffectual. In the slighter forms of continued fever arising in other causes besides infection they may be occasionally useful; but in the far more numerous and important class of infectious fevers, febrile action cannot be cut short at its origin.

The special remedy which has been chiefly vaunted for this purpose is an *emetic* of ipecacuan and tartarised antimony. When administered so as to act forcibly during the stage of formation of the disease, when chills or rigor are present, and febrile reaction not yet fully established, it is held to possess the power of arresting the morbid process entirely; and this by virtue of the powerful succussion which is given to the whole system, followed by diaphoresis and sweating. There is no question that by such practice irregular distribution of temperature may be counteracted, and the stage of formation of fever shortened. But it may be greatly doubted, whether any true case of infectious fever is ever fairly cut short in that way.

Emetics however are often of much service at the commencement for another purpose. They remove crudities from the stomach, which are often present in consequence of the patient having indulged his appetite recently before or soon after the invasion of the disease.

Other remedies have been also proposed as useful in the incipient stage of fever for cutting it short; and, among the rest, general bloodletting. But the efficacy of the whole of them is at least as doubtful as that of emetics, so that it would be a mere waste of time to discuss their several merits. As for *bloodletting*, it has been chiefly employed with the expectation of cutting the fever short at a later period, when febrile action is fully formed.

Treatment of the early stage. By the early stage of fever is here understood that interval, commonly extending to the first week, but rarely later, during which there is more or less reaction of the circulation, and the faculties of the mind continue unimpaired. In this stage the indications of cure are, to cut the disease short, to mitigate the force of reaction, and to remove or diminish special symptoms and secondary disorders.

1. The remedies which have been chiefly trusted to for *cutting fever short* in its early stage are emetics, the cold affusion, and general bloodletting.

Emetics are not of more service for this purpose when reaction is fully formed, than at the first invasion of fever. They are now indeed very generally abandoned as inefficacious when the disease has proceeded so far; and their use is mainly restricted to the removal of crudities from the stomach.

The *cold affusion* was proposed at the commencement of the present century by Dr. Currie, as a remedy both for arresting and mitigating continued fever. It is applied by seating the patient in a tub, and pouring cold water freely from a pitcher over the head; and repeating the process as often as the febrile heat returns. This treatment is applicable only in cases of synocha, synochus, and the few cases of typhus where reaction of the circulation during the first days is distinct. For a condition much insisted on by its discoverer, and found

essential by all his imitators, is, that not only the temperature as ascertained by the thermometer, but likewise the sensation of heat, either felt by the patient or communicated to the hand of another, shall be steadily higher than the natural standard; and it is only in fevers with a distinct early stage of reaction, that the animal heat is so circumstanced. Another condition for the success of the cold affusion in cutting short fever is, that it shall be resorted to at an early period, especially on the second, or not later than the fourth day. At a later period it may be a palliative; but it is admitted by all its admirers to have seldom the effect of arresting the disease. A third condition, and one of obvious importance, is, that there shall not be present any acute local inflammation.

The success obtained from the cold affusion when practised with these precautions seems to have been for some years very remarkable; and the confidence of physicians in its efficacy was naturally not a little increased by its apparent utility in other febrile diseases, such as scarlatina. It is singular, however, how short a reputation it has enjoyed. In the first extensive British epidemic of continued fever which broke out subsequently to its announcement, it was speedily abandoned in a great measure by all practitioners; and for twenty years past it has been almost unknown in the treatment. The cause of this fluctuation in medical opinion is not very clear; but there can be no question, that the change was not made without sufficient reason. The epidemic of 1817-20, — which, it has often been already remarked, ravaged more or less the whole of the British Islands, — seemed by its eminently inflammatory character, and the high pure reaction of its early stage, to be exactly the form of fever for treatment by the cold affusion. Accordingly the practice was tried by many with great perseverance. The general results were, that extremely few cases appeared to be checked by it; that, although the abatement of febrile heat and restlessness, which was indicated by Dr. Currie as its immediate effect, occurred almost invariably, this was nevertheless of short duration, and not to be made permanent by any frequency of repetition; that, as much good eventually was attained by frequent cold or tepid sponging, together with cold applied to the head; and that frequently it occasioned for a short time after each application an intense feeling of pressure and weighty pain in the centre of the brain, which could not be regarded without some uneasiness. Since that time the continued fever of this country has been gradually assuming more and more a typhoid type, in which the conditions for success laid down by Dr. Currie seldom exist; and consequently the treatment has in late epidemics fallen properly into desuetude. But its failure in the earlier inflammatory epidemic of 1817-20 has always appeared unaccountable. Some have even been led in consequence to doubt the accuracy of Dr. Currie's observations. They were so generally confirmed, however, soon after they were published, that such doubts are unreasonable. It cannot be rationally denied, that the fever treated by himself and his earlier imitators was susceptible of being cut short in its course by the cold affusion. And there seems no mode of reconciling the discrepancy of the facts relative to the utility of this remedy, except by referring it to those hidden differences in the epidemic constitution of fever as well as other diseases, of which, though we cannot well indicate their precise nature, we may trace the operation in a variety of equally interesting circumstances in their history. The time then may come round again, when the cold affusion will arrest continued fever; so that it ought not to be forgotten among the remedies to which this property has been assigned.

General bloodletting has long been a favourite remedy in continued fever for a variety of purposes. In the present place some notice must be taken of its alleged power to cut fever short. It was employed to a great extent for many objects in the epidemic of 1817-20; and this is probably the period when its effect in abruptly arresting the disease was first fully established. In order to employ it efficiently with this view certain conditions must be attended to. It is to be used only in cases of synocha, or of synochus with a well-marked inflammatory stage. It should be resorted to not later than the sixth day, and

if possible earlier. In the inflammatory fever of hot climates it is probably impossible to be too prompt in the use of the lancet after reaction is fairly formed. But in the epidemics of inflammatory fever which have prevailed in Britain since 1817, it is singular that bloodletting has rarely been of any service, if practised before the fourth day with the view of cutting short the disease. The remedy must be pushed nearly to the same extent as in febrile inflammations. A small quantity of blood, whatsoever its immediate effect, is never of service. Faintness ought always to be induced; but even the securing this result will not insure any probability of success, unless at the same time the quantity of blood withdrawn be considerable, such as twenty, twenty-four, thirty ounces, or upwards. In a very few cases so treated the pulse never returns to its state of reaction, and the fever is substantially arrested, without the intervention of any other functional phenomena. In other instances, and these more frequent, the faintness is followed by perspiration ending in critical sweat; but more frequently still the febrile action revives, goes on in a mitigated form for a day, and is then terminated by a diaphoretic crisis. If not, the repetition of the bloodletting may bring on the crisis then, or on the subsequent day. Such is a sketch of the effects of general bloodletting in the remarkable epidemic of 1817-20, as well as in later epidemics down to 1828. Such particularly were the results where the remedy was resorted to on the fourth or fifth day of fever in young healthy subjects: diaphoretic crisis in such circumstances might be very confidently relied on before the close of the sixth and generally on the fifth day; whereas, in a majority of cases of the like kind treated without bloodletting, or left at home without treatment at all, the disease ran on to its secondary typhoid stage.

In the fevers which have prevailed for some years past these salutary effects of general bloodletting have ceased to be presented. It has been already repeatedly remarked, that for at least fifteen years continued fever has been gradually assuming more and more of the typhoid type over the whole country; but especially in Edinburgh has this change been strongly marked. A corresponding change has taken place in the effect of remedies, and of bloodletting more than any other. Many practitioners, trained to its use in previous years, continued for some time to adhere to it as the type of the disease changed; but all have long ago ceased to expect that, by such a measure, fever may be broken abruptly in its progress.

2. The remedies which have been used for *mitigating the force of reaction* in the early stage of fever are exceedingly numerous. They comprehend also a large proportion of the best measures for abating or removing special symptoms and secondary local disorders. They are chiefly general bloodletting, local bloodletting, cold in various shapes, diaphoretics and sudorifics, antimonial sedatives, cathartics, and low diet. Other remedies which have been also employed with the same view, may be more correctly considered as specifics, and will be noticed under the treatment of the advanced stage, to which they are probably more applicable.

General bloodletting has been much practised in all forms of fever since *Dr. Armstrong* recommended it in congestive typhus, and since its general introduction into the treatment of the inflammatory epidemic of 1817-20. Its use in arresting fever has just been adverted to. But it has been further practised to a great extent for moderating the force of reaction in the early stage of all fevers, where reaction is at that period well-marked; and it is unquestionably a valuable remedy for this purpose, though there may be little expectation of cutting the fever short.

In order to use it with effect and safety the following conditions should be attended to:—1. It is most serviceable for moderating reaction in epidemics which tend to the inflammatory character, and in cases which put on the form of synocha or synochus. Although some also employ it in the early stage of typhus, the prudence of such practice may be greatly doubted: indeed, there is seldom such amount of reaction as to call for general bloodletting in a case

of genuine typhus; and the symptoms which may seem to authorise it will for the most part be found to yield equally well to the milder remedy, local bloodletting. General bloodletting has been seldom resorted to, and never freely, in true typhoid cases of late epidemics, without reason being subsequently seen to regret it when the typhoid stage came to be fully formed. 2. It should be employed only where general reaction runs high, as ascertained by the state of the pulse, the animal temperature, and local signs of inflammation. 3. It should be regulated as to extent partly, of course, by the age and constitution of the patient, and partly by the type in the particular case, but in part also by the prevailing character of the epidemic,—larger evacuations being borne well in the same description of cases in inflammatory than in typhoid epidemics. 4. Of special criteria for regulating its extent, the safest and most precise is the state of the pulse both before the vein is opened, and likewise under the flow of blood. It is most useful where the pulse is incompressible, whether it be full or contracted, whether very frequent or moderately so; and when it improves in softness if full, in fulness if contracted,—but not under a very slight loss of blood. It is least useful and often inadmissible, where the pulse is easily compressible, whether soft or jarring, and whatever its frequency; and when, under the flow of blood, it becomes either more jarring or easily and quickly feeble, and fluttering or slow. 5. The effect on the one hand upon the symptoms of reaction, and on the other upon the adynamia or nervous exhaustion, will generally decide whether the remedy has been correctly appealed to, and whether it ought to be repeated. And where doubts may remain as to repeating it, they may often be resolved by the state of the blood; which, if presenting a firm clot, and still more any appearance of a buffy coat, may warrant the repetition of the remedy; while a clot with little colouring matter, and a loose gelatinous consistence, commonly indicates the necessity of forbearance. On the whole, much practice and discrimination are required to use general bloodletting with advantage and even with safety, for moderating reaction in the first week of continued fever. If harm originated in the early epidemics of the last twenty years, as many with justice have insisted from a dread of the lancet, there can be no question, on the other hand, that even in these epidemics, and still more in those of recent periods, equal injury has accrued from indiscriminate confidence in it,—arising, it is presumed, from a disbelief in the doctrine, that fever consists essentially in part of primary nervous exhaustion, and from an overweening reliance in the theory, that this exhaustion is merely secondary to preexisting reaction.

Local bloodletting is in all kinds and in all stages of fever a remedy of the first importance for a variety of purposes. Among other effects it has sometimes that of mitigating reaction in the early stage. This is accomplished in one of two ways,—either by the quantity of blood withdrawn being such as to have in some measure the effects of general depletion, or by its singular power in removing local inflammation, even where the actual loss of blood is inconsiderable.

Cold is an approved means of subduing excitement in the early stage; and it may be employed advantageously in various shapes, such as cooling drinks, cool air and ventilation, cold effusion, cold sponging, the cold douche, and other modes of applying cold to the head.

It may seem superfluous to mention *cooling drinks* in the present day as one of the means of abating reaction and contributing to the patient's comfort. Yet it is not very many years since drink generally was looked on with distrust, and cold drink in particular prohibited. In continued fevers of every type, however, cold drink is longed for by the patient, and is properly allowed, but under two restrictions,—first, that it shall be given in moderation at each draught to prevent disorder of the stomach being induced; and, secondly, that when diaphoretic crisis seems to approach or has commenced, cold shall be exchanged for warm drink. Patients in the early stage of fever are extremely capricious in their choice of drinks; and the physician should be prepared to indulge

them with variety. Barley-water, water-gruel, and toast-water, the staple drinks of some practitioners, are relished by few patients; currant-jelly-water, capillaire-water and the like, are also seldom taken long; lemonade- or orange-juice-water and effervescing powders are usually more palatable: the most pleasant acid drink, however, for fever patients is water acidulated with cream of tartar or sulphuric acid; but that to which they adhere longest and throughout every stage is soda-water, which in most circumstances may be allowed freely. When the first week is over, or even earlier, all medicated drinks are commonly loathed, and spring-water and soda-water alone relished.

It was at one time the practice to treat fever with warmth and close air to keep the fever out. It is long, however, since both physicians and patients found that comfort was better secured by *coolness and ventilation of the air;* which therefore now hold a prominent place among the measures for moderating reaction. But many push this article of regimen to excess, thereby occasioning local inflammations, and even probably undue depression, especially if they persevere with it also in the advanced stage; and accordingly there are some who, from dread of these results, seem inclined even in these modern times to revert to the ancient suffocating system. The truth is, no rule in regard to cold air and free ventilation applies in all circumstances. Hence the ordinary system of ventilation in hospitals, especially in winter, is bad, and all the worse that it is practised only during the visits of the medical attendants. The chief rules to be attended to are these:—The patient's own feelings are generally the surest test, and may be safely trusted, so long as his mind does not wander, even though he demand what his attendants cannot endure. In inflammatory fever, and the early stage of almost all fevers, cool air is of essential service in mitigating restlessness and the violence of reaction, and should never be withheld except for strong special reasons. The marked benefit derived from gestation in the open air, which was first urged by Dr. Jackson, and has often been experienced in military and sometimes in civil practice, is probably in a great measure owing to coolness and ventilation, One must have had a severe fever to be aware of the luxury of fresh air and a breeze; and no one who has had that advantage will question their general utility. The rigour of cool ventilation must be moderated even in the early stage of fever, when serious local inflammation is present, at least in the larynx, bronchial tubes, pulmonary tissue, peritoneum, and intestinal mucous membrane. It must likewise be modified where there is irregular distribution of temperature, or much nervous exhaustion, and generally in the typhoid forms of fever, where the animal heat is little increased.

The *cold affusion* has been used for mitigating reaction as well as for cutting it short. Its utility for the former purpose seems governed by the same rules which govern its application to the latter. In fevers, which may be cut short by it near their commencement, it allays reaction at a stage too late for that result to be expected; in other fevers it is of doubtful service; and the more the disease tends to the typhoid type, the more equivocal becomes the remedy.

Cold sponging of the whole body, or of the head, face, neck, chest, and shoulders, has been substituted with great advantage for the more energetic affusion. There are few fevers in which reaction is not mitigated for a time in the early stage, and the patient's comfort essentially improved, by this remedy, if faithfully persevered in. The heat of the skin, however, ought to be above the healthy standard; irregular distribution of temperature must not be present; and great nervous exhaustion is also a contra-indication. In such circumstances tepid sponging is properly substituted. There is no use in medicating the water with vinegar and the like, except to inspire the attendants with more trust in the remedy, and thus secure its faithful application.

The *cold douche of the head*, *wet evaporating cloths*, and the *ice-bag*, are often of great service in moderating reaction; but their influence is probably in-

direct, through means of their operation as local remedies in moderating determination towards the head.

More reliance perhaps has been placed in *antimonial sedatives* for allaying reaction in the early stage of continued fever than in any other remedy. Antimonials have been used in three ways in this stage,—according to the contro-stimulant plan in frequent large doses, in small doses as nauseating sedatives, and in still less doses as diaphoretics. The contro-stimulant method, the theory and details of which are explained in other parts of this work, and which, if not first conceived, was at all events first successfully propagated as a doctrinal practice, by *Rasori*, consists in the administration of doses of tartar emetic every two hours, varying from one to two or five grains or upwards; and it is represented that the effect is simply to reduce reaction, to act as a constitutional counter-stimulant, without necessarily any other physiological action being developed among the various actions of the kind possessed by this antimonial preparation. By this method Rasori maintained that very many febrile diseases, and continued fever among the rest, may be successfully treated. Without presuming to decide the general question of the efficacy of such practice in continued fevers at large, it may be simply mentioned, that no success whatever has attended the trials made of it in the late fevers of Britain, and that the contro-stimulant phenomena even have not been witnessed at all. And as a proof of the fairness with which these trials have been conducted, it is right to add, that in the hands of those who made them, the same practice was found to elicit in pneumonia and some other organic inflammations all the essential phenomena which Rasori describes. The method by nauseating doses of James's powder and tartar emetic is a much more ancient and general practice than the Rasorian plan. It was much confided in by Cullen, and continues still a favourite system of cure both among his disciples and others. It appears well-established, that doses of about a quarter of a grain of tartar emetic given every one, two, or three hours in one or two ounces of some convenient liquid vehicle, so as to keep up nausea, with as little vomiting as possible, will often contribute in some fevers to keep down reaction in their early stage. But in many epidemics the effect of this kind is slight and equivocal. Especially has this been the case for some years past in the British continued fever: so that, although still generally pursued by many, the practice seems rather to rest on routine prejudice, than on satisfactory evidence of its utility. It appears on the whole most serviceable in the early stage of those forms of synochus which approach to typhus, and may be in them advantageously substituted for general bloodletting. The result is never in any case at all to be compared with the effects of the same practice in the advanced stage of some febrile inflammations, such as pneumonia, or in the early stage of erysipelas. As to the third method of administering antimonials, namely, as diaphoretics, all that can be said on this head may be equally well-stated under the head of diaphoretics in general.

In 1817, when the rising medical generation first saw continued fever on the large scale, they found almost every case treated as a matter of course with *diaphoretics*. The pharmacopœia of every hospital teemed with diaphoretic formulæ, in which acetate of ammonia and tartar emetic performed a conspicuous part, and of which every fever patient had his share. It was universally observed however that the diaphoretic plan, whether by antimonials or otherwise, was of no avail; diaphoretic mixtures were banished, except from routine practice; and this method has never regained any footing since. The truth seems to be, that in some forms of sporadic fever of a mild kind, especially those occurring in children, which are not referrible to infection, and which approach in nature to irritative gastric fever, diaphoretics are often singularly serviceable, but particularly the solution of acetate of ammonia in two-drachm or half-ounce doses frequently repeated, or frequent doses of an eighth of a grain of tartar emetic largely diluted, or James's powder, to the extent of three, five or seven grains occasionally. But when fever assumes the epidemic form in

cases referrible to infection this practice is wholly futile. We are bound to receive with deference the favourable statements of the physicians of last century on this matter. But the truth cannot be denied, that their great antiphlogistic weapon, the diaphoretic method of cure, has proved pointless in all recent British epidemics. Sudorifics have been less extolled at all times in fever; and it is apprehended that few now think of employing them in the well-marked and severe forms of epidemic fever, where, if they were useful at all, there would not be long wanting satisfactory evidence of their efficacy.

The employment of *cathartics* for checking early reaction in fever first became general about the beginning of the present century, through the writings of the late *Dr. Hamilton* of Edinburgh. Like other enthusiasts Dr. Hamilton pushed too far his confidence in his favourite method; and some of his imitators brought it into discredit by trusting to it alone where more powerful and instant means were necessary, or by resorting to it in circumstances of great exhaustion, where neither the discharge occasioned by free purging, nor the consequent fatigue, could be borne with impunity. In all cases of continued fever in the early stage, unless where some peculiar contra-indication occurs, mild laxatives, such as moderate doses of senna, castor-oil, rhubarb and magnesia, aloetics, and the like, are essential in modern British practice for counteracting the tendency to constipation, which is very regularly present at this period. More active doses of senna, the compound colocynth mass, neutral salts, fortified or not by tartar emetic, are also prevalently resorted to at first for occasioning brisk purging; because such a measure is clearly found serviceable in keeping down febrile reaction. Perhaps no combination in general answers better for the purpose than either the compound colocynth mass at night, followed by sulphate of magnesia or some other neutral salt in the morning, or a solution of an ounce and a half of sulphate of magnesia and two grains of tartar emetic in twelve ounces of water, of which two, three, or four ounces are given every hour, or alternate hour, according to the effect produced or desired. The refrigerant sedative action of such treatment is often unequivocal. In cases of typhus of the pure kind, especially where the adynamia is great and early, the purgative method must be mitigated and confined to simple evacuation of the contents of the bowels. The exhaustion is otherwise dangerously increased; and even hazardous fits of fainting are induced by the frequent exertions which are rendered necessary. In cases too where inflammation of the intestinal mucous glands is formed or threatened, it is commonly held by those conversant with the particular form of fever, that all purgatives except the gentlest are inadmissible. But others, admitting their questionable service in such circumstances, also with some show of reason add, that the local disease of the bowels is in all probability apt to be developed in consequence of the physician neglecting the bowels while in a state of protracted constipation.

Low diet is an indispensable part of the treatment in the early stage for subduing general reaction. But the physician is seldom put to much trouble in prescribing this measure, since nature generally enjoins it by removing the appetite; and the principal duty of the medical attendant is confined to controlling the indiscretion of friends, who will often be scarcely persuaded that a patient in fever may live with little or no food for days and weeks together. The simplest farinaceous articles, and even these in small quantity, with tea and such other slightly nutritive liquids, constitute the brief diet-roll of the fever patient in the early stage of his illness.

3. The last of the indications of cure in the early stage of fever is *to abate and remove local disorders and special symptoms.* The most important remedies which come under this head are those employed for arresting local inflammation; which will therefore be mentioned in the first instance.

Secondary local inflammations may be often arrested by the same means which are rendered advisable for subduing general reaction. Hence they are often removed when reaction in the early stage is mitigated; and more fre-

quently they disappear, although the reaction, the more direct object of the treatment, should, as often happens, continue unabated. Local inflammation in fever is for the most part much more easily subdued, than either the fever itself or idiopathic local inflammation. It is seldom, for example, that general bloodletting is required for this alone. Local evacuation of blood is commonly sufficient; and where there seems a necessity for opening a vein, the loss of blood required is comparatively inconsiderable. Hence in the laryngitis, catarrh, pneumonia, and other local inflammations of fever, the employment of a few leeches may generally prove an active enough remedy, so far as evacuation of blood is concerned; and this observation applies peculiarly to those epidemics which tend to the typhoid type. Blisters are also often of effectual service, especially in catarrh, pneumonia, and gastric irritation, where they frequently act with energy although local depletion has failed. Rubefacients even are sometimes of service, especially in cynanche tonsillaris and the slighter form of laryngitis, which in these climates is a common accompaniment of fever. Tartar emetic in nauseating or diaphoretic doses is useful for combating local inflammation, particularly catarrh and pneumonia, although of little moment as a general antiphlogistic against the fever itself. In cynanche tonsillaris some advantage is derived from the customary stimulant gargles; in laryngitis, from mucilaginous demulcents and inhalation of warm water and vinegar; in bronchitis, from expectorants, more especially squill united in the form of a mixture of the syrup with laudanum or muriate or acetate of morphia; in cynanche parotidæa, from warm fomentations and poultices. In entero-mesenteric inflammation, which seldom however commences, or at least betrays its presence, in the early stage of fever, the most promising treatment consists in the application of leeches repeatedly to the abdomen, particularly in the right iliac region, the faithful employment of fomentation, the administration of large doses of chalk-mixture with half-drachm doses of ipecacuan wine and a little laudanum, the use of gently anodyne clysters where the diarrhœa is very troublesome, and perhaps gentle mercurialisation of the system, with occasional gentle laxatives where other remedies induce too constipated a state of the bowels, or, instead of laxatives, gently stimulant clysters.

Of other local affections the most material are determination of blood towards the head, and gastric irritation. Headach, a symptom seldom entirely wanting, and always when present much complained of, is most effectually relieved by leeches and cold evaporating cloths. In fevers of a typhoid tendency the former remedy is the more effectual of the two. It is indeed surprising to observe, how often a few leeches in the early stage of typhus, or typhoid synochus, will remove or materially mitigate headach for the rest of the fever. When, on the other hand, the tendency of the fever is to the inflammatory type, cold evaporating cloths are usually more serviceable, particularly when preceded by leeches: but, to do any good, they must be applied much more carefully than is customary, especially in hospitals. In severe cases a bladder half filled with broken ice may be advantageously substituted for wet cloths; but it must be observed, that few patients can bear for more than a few minutes at a time the pungent impression thus made upon the integuments, and that the ice should be frequently removed for a short interval. The ice-bladder is particularly serviceable where headach is combined with much heat of the integuments of the head, and generally in all cases where the symptoms appear to threaten secondary local inflammation. Cold ablution of the head is preferred by some patients, and is also an excellent remedy. Convulsions with coma, occurring in the early stage of fever, were stated in a former section to be invariably fatal. Copious bloodletting from the arm, as well as the temporal artery, the ice-bag to the head, powerful cathartics, the warm-bath, and on the other hand also stimulants, have been tried in the cases observed in Edinburgh, but without making any impression on the disorder.

Gastric irritation in fever may amount to inflammation, and is often treated

successfully as such by leeches and blisters to the epigastrium, occasionally united with gentle anodynes. But the same remedies are also frequently very useful, where no doubt can exist that the nature of the affection is irritation at most, or nervous and functional. Tenderness at the pit of the stomach, a common symptom, is most effectually subdued by leeches, particularly in typhoid cases. Sickness and vomiting are sometimes relieved by frequent small quantities of cold drink, sometimes by effervescing draughts, more generally by leeches, but best of all by a blister over the stomach.

In the hepatic affection, described among the secondary abdominal diseases as an occasional accompaniment of fever in the early stage, and as characterised by a jaundiced colour of the skin and commonly bilious stools, the most efficient treatment is prompt mercurialisation. Such cases have generally been observed in the epidemics of Edinburgh to resist all other remedies, and to prove swiftly fatal with extreme prostration. But, in several instances, where calomel was given in a large quantity, to the amount, for example, of a drachm in twenty-four hours, recovery took place; and the crisis was coincident with the first appearance of mercurial action.

Such are the leading points to be attended to in the treatment of continued fever in its early stage. This stage, it has been often observed, commonly lasts for one week. When the fever continues longer, the nervous exhaustion begins to predominate, reaction declines, typhoid symptoms are soon developed, and new indications arise in the treatment. These may sometimes originate, however, long before the close of the first week, occasionally even near its commencement. The necessity, therefore, of a very different plan of treatment from any yet mentioned being required in some instances at a very early period of fever, must never be lost sight of. But in a very great majority of cases, no such necessity arises till the close of the first, or beginning of the second week; and it is observed that, on an average, those cases do best where antiphlogistic or "expectant" treatment may be continued till then.

Treatment of the middle stage. The middle stage of fever, as characterised by time, may be said to extend from the close of the first week to between the eleventh and seventeenth days. But, more correctly, it comprehends the interval between the period when the symptoms of nervous exhaustion begin to predominate, and the period when a favourable crisis is promised, or a fatal event is threatened. In this stage, the objects of treatment are to mitigate reaction, to support exhaustion, and to subdue local disorders.

1. In many cases and epidemics of fever, which present a marked typhoid character, the force of reaction in the middle stage is so inconsiderable, that it may be almost disregarded in the treatment. But in other cases, and in particular epidemics, reaction continues an important object in the method of cure, and not the less so, that it is complicated with some degree of nervous exhaustion or typhoid depression. Accordingly, it happens sometimes that, for this purpose, the active antiphlogistic measures of the early stage may be requisite even in the course of the second week. Far more generally, however, the practitioner must bear in mind that exhaustion of the strength, the indirect result of previous excitement, — as well as the development of the primary nervous depression, which is never wanting in one degree or another in any case of fever, — renders it indispensable to mitigate materially the energy of the antiphlogistic method.

More especially do these remarks apply to the use of general bloodletting. The employment of it may be governed by the same rules as for applying it to the treatment of reaction of the circulation in the early stage. But the contra-indication, arising from the risk of injuriously augmenting exhaustion, is doubly strong in the middle stage. Much practice is required to use it judiciously at this period. The general rules are, to observe carefully the prevailing character of the epidemic, the particular type of the case, and the condition of the pulse. And, in judging from the state of the pulse, care must be taken not to err, as the inexperienced are apt to do, by mistaking for a firm

pulse of reaction the full, jarring, but easily extinguished pulse, which is common in the middle stage of fevers of the typhoid or adynamic type. On the whole the prevailing impression seems to be, that general bloodletting is, for the most part, a questionable remedy for abating reaction in this stage; that more injury than good has been done by its introduction into practice with that view, in consequence of its having been used too indiscriminately by the inexperienced or the prejudiced; and that a better indication for its employment is the removal of congestion of internal organs.

Of other antiphlogistics, cool air, cold drinks, and cold or tepid sponging, are much in use for moderating reaction in the middle stage. Their extent and degree must be regulated by nearly the same conditions as in the early stage, and always mitigated where exhaustion is great, or the temperature of the body either irregularly distributed, or not elevated. Antimonial sedatives are of no use; and the whole class of diaphoretics are equally inefficacious. Such, at least, is the experience of practitioners in the epidemics of the last twenty years. Cathartics are of more general application than other antiphlogistics. A moderately open state of the bowels, by means of any of the purgatives formerly mentioned, seems to answer better in the generality of cases of primary continued fever in this country than any other means of counteracting general excitement in the middle stage. But, for reasons formerly given, they must not be used too freely; and all drastics must be shunned, where the primary nervous exhaustion, or secondary depression, is very great. And likewise they are contra-indicated by entero-mesenteric disease. Where debility forbids the use of purgatives, it is essential to maintain the bowels open by means of clysters.

2. The counteracting of exhaustion is, in a majority of cases of fever, the most important object of treatment during the middle stage. In not a few cases, as already observed, it even becomes an essential part of the system of cure in the early stage. Pathologists have indicated two varieties of nervous exhaustion as occurring in the middle stage of fever, one primary and essential, produced directly by the cause which excites the fever, the other secondary, the consequence of antecedent reaction, and observing some ratio to the degree of that reaction. Although this is probably a correct distinction in a pathological point of view, it is of no great moment, so far as regards the remedies for the state of exhaustion; for, in either case, it may be similarly treated.

The chief remedies for exhaustion are wine and other alcoholic fluids; to which some add camphor, opium, chlorine, yeast, certain saline mixtures, and mercurialisation. The food also at this period sometimes requires regulation. Some of these remedies, indeed, may be regarded more correctly as administered in the shape of specifics, than as mere stimulants for counteracting exhaustion. But they may nevertheless be considered, without great impropriety, under the present head.

When the state of exhaustion is well-marked, it is seldom possible to do without wine or some other alcoholic fluid. Wine is commonly preferred, and in this country the stronger wines are thought most suitable. But when the adynamic state is very great, the stimulus of wine is sometimes insufficient, and it becomes necessary either to add strong spirit to the wine, or to substitute diluted spirits. This step is often peculiarly necessary in the instances of habitually intemperate livers, in whom wine, in such quantity as may be conveniently administered, has little or no effect, simply because their constitutions have become proof by habit against the influence of weak potations. Malt liquors can seldom be used instead of wine or spirit, because they are not strong enough for ordinary purposes, and because they are apt to disorder the stomach by means of their extractive ingredients. The quantity of wine or spirit which is necessary varies exceedingly. No definite rule can be laid down on that point. Generally it is right to limit the first administration to four ounces, or two wineglassfuls of wine in twenty-four hours. Many patients, however, eventually use a whole bottle without injury, though previously

unaccustomed to any alcoholic fluids; and even this amount is not unfrequently exceeded. A person not habituated even to wine, has been known to take for a short time two bottles of port and half a bottle of brandy, without any other than a salutary effect on the pulse and general course of the disease; but this is an extreme case. The wine may be given alone, or made into drink with cold or warm water: and an excellent mode of administering it, where the patient is not too torpid, is with a little soda-water.

The best indications for wine are a soft and not jerking pulse, a tongue without much yellow or white coating, a temperature not particularly elevated, paleness, or at least diminished flushing of the face, the absence of local inflammation, and a drowsy torpor, without either high delirium, or, on the other hand, profound coma. The opposite signs are not always contra-indications; but, when any of them is present, wine is not so certain a remedy; and some of them imply preliminary or contemporaneous treatment of another kind. A small wiry or full hard pulse is commonly a positive contra-indicant. So too are a very foul loaded tongue, considerable elevation of temperature, smart local inflammation, much flushing of the face, with heat of the head, pulsation of the temporal arteries, and other symptoms of cerebral determination of blood. High delirium and deep coma are not always contra-indicants, as they may arise from excess of depression; but they are sometimes associated with obvious determination towards the head, or congestion of the brain; and in that case stimulants should be avoided for a time, or more frequently treatment by general stimulants should be combined with local treatment by leeches, cold, and blisters, as will presently be described under the head of remedies for the secondary disorders of the middle stage.

The proper time and occasion for commencing the use of wine often involve a very nice practical question. On the whole, more harm is done by resorting to it too soon, than by withholding it too long; and it is right, if possible, to get the patient through the first week before administering it; which is generally practicable, except in marked typhoid cases. As in many circumstances some doubt will exist, whether the time for it may have arrived, great consequence is always attached to close observation of the effects of the first few doses. If the pulse become more frequent, or more jarring, or the tongue more dry, or the flushing of the face worse, or the breathing quicker, or the stupor deeper, or the delirium or restlessness greater, it must be abandoned. If the pulse expand, or soften, or lose its jarring character, or fall in frequency; if the tongue become softer, moist on the edge, and more easily protruded; or the countenance continue clear, with the eye more lively, or the breathing softer and less noisy, or the stupor more easily interrupted and more similar to mere sleepiness, or the delirium and restlessness less considerable, — the remedy has been appealed to at the proper conjuncture, and may be continued. It sometimes happens, that, where wine has thus been properly administered, although it acts for a time beneficially, yet in twenty-four hours or upwards it begins to act injuriously, producing the contra-indicating phenomena just mentioned. This is a circumstance not always adverted to by those extravagantly addicted to prescribing wine in fever. But it certainly does appear as if sometimes nature were the better for a little temporary impulse in the shape of wine, and nevertheless cannot stand continued stimulation. Observations of this kind occur particularly in synochus, and, above all, where the preliminary stage of reaction is distinct. On the contrary, it is a far more general rule, that where wine has been clearly proved by its first effects to be a proper remedy, the artificial stimulus, once obtained, must be regularly kept up by stated doses, which must be also occasionally increased. Attention to this rule is especially necessary in the night-time and towards morning, when the state of depression is at the lowest. The fidelity of the personal attendants of the sick during this period should be scrupulously insured if possible. It is well-known to hospital physicians, that not a few severe cases of fever in the typhoid state are lost in consequence of being neglected in the night-time, and

left for some hours without the stimulus which they had been accustomed to receive during the day.

Little need be said of the other remedies mentioned above, as occasionally employed to counteract typhoid exhaustion. *Opium* has been used by a few in frequent small doses as a stimulant; but its fitness for this purpose is generally distrusted, and the danger arising in the latter stage of typhus and synochus from congestion, especially of the brain, seems a sufficient contra-indication. *Camphor* was highly thought of by Cullen, and is still administered by many, partly as a sedative of the nervous system to allay inordinate irritability, partly as a stimulant of the circulation to counteract debility. It is given in the form of emulsion, and in the dose of one or two grains every four or six hours. Cullen however urges, that the smallness of these doses was the reason why many practitioners complained of not obtaining the good effects he announced; and that five grains ought to be administered at a time. Now-a-days few put any trust in this remedy in a genuine and severe case of continued fever. In recent times, among other new remedies for fever, *yeast* in frequent doses has been proposed as a means of opposing exhaustion; but it has not come into so general use, that any opinion can be formed of its utility. The same may be said of *chlorine* in the shape of chlorine-water: at first employed as an antiseptic in the days when putrescency of the fluids was a received dogma in the pathology of fever, it has been more recently recommended as a stimulant, or a specific, against the typhoid state. But no satisfactory evidence has hitherto been adduced in its favour. Much interest was excited a few years ago in this country by the *saline treatment* of fever — a novel mode, originating in the doctrines of Dr. Stevens, relative to the dependence of fever on alterations in the blood. Conceiving that fever arises in loss of the saline ingredients of the blood, he naturally proposed to make good that loss by administration of the proper salts; and accordingly to trust the cure of the disease mainly to frequent doses of muriate and carbonate of soda, united with a little of the chlorate of potash. This treatment Dr. Stevens represented to be so successful in the remittent and yellow fevers of Trinidad, that upon one occasion 340 cures were accomplished in a military corps without a single death; and again, during an interval of nearly two years, 1010 cases were treated with a mortality of only one in ninety-two. It remains for Dr. Stevens's brethren in the West Indies to say, whether these statements are conclusive or fallacious, — which has not yet been done. Meanwhile, the notion that such treatment will apply to the typhoid fevers of temperate countries is erroneous. In the trials made of the saline method in Edinburgh, no advantage whatever could be observed in well-marked cases. The treatment, moreover, is based on what appears a grave pathological error; for the reduction of the saline materials of the blood in fever does not exceed the reduction of the colouring matter, the changes of which in respiration the salts are intended to secure; and the alterations of the blood, so far as they have been hitherto determined, are consecutive, not primary — the effect, not the cause of fever. The *mercurial method* of treating continued fever has at various times had its advocates; but it has never come into general use. Its followers maintain, that the antiphlogistic properties of mercury render it peculiarly applicable to the removal of fever; that, the development of mercurial action being incompatible with another action going on at the same time in the system, fever must cease where mercurial erethysm is excited; and in particular that, by its influence in rousing the energy of the capillary vessels, it has a salutary effect upon their state of congestion in the latter stage. Many however deny, that these theoretical views are realised in practice; and, on the whole, the preparations of mercury as mercurials are little used in the present day. From the trials made in late Edinburgh epidemics it would appear, that the induction of mercurial erethysm has sometimes a good effect in the instances of congestive typhus where the head is peculiarly affected; that in such cases, however, mercurial action is not easily excited; that in other varieties of fever it is less serviceable; and that

where its immediate advantage seems undoubted, much suffering and injury to the constitution may be occasioned by its ulterior effects.

The *regulation of the food*, in the middle stage of fever, is sometimes to be conducted upon different principles from those simple rules which have been seen to direct this branch of the treatment in the early stage. For the most part, indeed, the patient refuses aliment of every sort even in the middle stage; and where a little food is taken, his tastes confine him to simple farinaceous articles, — the only alimentary substances which at this time the stomach can generally endure. Towards the close of this period however, especially in cases of typhus or synochus of a severe description, where there is great languor and exhaustion of the bodily powers, the patient will sometimes surprise his immediate attendants by suddenly demanding animal food. It has been found that, wherever such request is not dictated by mere incoherent rambling, it may be safely acceded to, and is even in circumstances otherwise most unfavourable a very propitious sign. In all cases, and in all stages of fever indeed, except in convalescence, the dictates of nature in respect of food may in general be followed without risk of injury.

3. The removal of local secondary disorders in the middle stage of fever is very generally an important object of the treatment; and it is often rendered peculiarly so by the concurrence of great typhoid exhaustion, which is in some measure incompatible with the vigorous employment of local remedies. The local disorders of the middle stage are mostly the same with those of the earlier period. The treatment, too, is upon the whole similar, but modified merely in degree by the more exhausted state of the nervous system and general bodily powers.

Local inflammations are best treated by moderate topical evacuations of blood, chiefly with leeches, and by such speedy counter-irritants, as mustard cataplasms or blisters. It is surprising how much the ordinary local inflammations of the continued fever of this country are under the control of moderate topical depletion in the middle stage of the disease. So much is this the case, that the theoretical question, whether general bloodletting is admissible for the same purpose in that stage, is one which seldom occurs in actual practice. Blisters are peculiarly serviceable in inflammatory affections of the throat and chest.

Of all local disorders in the middle stage, those which are of most consequence in the fevers of Britain are clearly affections of the head; because they are the immediate cause of a very great proportion of the mortality from fever. These affections, it was formerly seen, sometimes present the inflammatory character, but much more frequently the characters of cerebral congestion merely. Where the symptoms are such as are commonly thought to indicate an inflammatory tendency, that is, where the face is flushed, the head hot, the temporal stronger than the radial pulse, the delirium active and noisy, and the patient restless, unable to sleep, or inclined to roam about, the most appropriate treatment consists of leeches occasionally to the temples, evaporating cloths, the ice-bag, and the cold douche of the head, together with occasional cathartics. No remedy equals the cold douche in such circumstances for subduing restlessness and active delirium. Where, on the other hand, cerebral congestion is the nature of the local disease, as indicated by a feeble though often jarring pulse, great prostration and stupor tending to coma, a dingy complexion, dark injection of the conjunctivæ, subsultus of the tendons at the wrist, and the like, little advantage is derived from cold applications, which are so useful in more active affections. But local depletion by leeches is often serviceable; and more frequently marked benefit is obtained from blisters applied over the whole head. With these remedies ought to be united occasional laxatives where the bowels are constipated, or still better perhaps purgative clysters, especially if the debility be very great; also warm fomentations of the limbs, mustard cataplasms to the calves, or other means of exciting gentle counter-irritation of the extremities. With the local treatment it is generally necessary to unite the use of wine, for maintaining the strength and counter-

acting typhoid exhaustion. This general measure is by no means incompatible with the use of local evacuants and counter-irritants, as might appear on a hasty view of their respective actions. In point of fact, marked and speedy advantage is often obtained in the worst forms of cerebral congestion by the combination of wine for its general, with blistering of the head for its local, effects. Blisters ought not in such circumstances to be applied to the nape of the neck, as is the practice of many, unless where no other space is left; for at the very least great torture is occasioned to the patient during the weak irritable condition of convalescence, and frequently vesication is followed by exhausting suppuration, sometimes by dangerous sloughing. The practice of others of applying blisters between the shoulders in such circumstances is still more to be avoided. Superficial suppuration is then almost inevitable, and fatal sloughing not uncommon.

Secondary affections of the chest, when inflammatory in nature and not of prior existence to the fever, are in general easily removed in the middle stage by local depletion, sinapisms, or blisters. The affection of the bronchial membrane, which was described formerly among secondary disorders, under the title of congestive catarrh, is best treated by blisters, united with the proper general treatment of the typhoid exhaustion, in which state alone it is ever observed to become considerable.

Of local disorders of the abdomen the most material is entero-mesenteric inflammation, which generally first shows itself in this stage. Its treatment has been already described under the treatment of secondary diseases in the early stage.

Among diseases of the skin, the most frequent requiring attention is excoriation from pressure, tending to gangrene and sloughing; and one of the most dangerous, though fortunately not of common occurrence, is erysipelas. In the middle stage of fever, especially towards the close of the second week, the sacrum is so apt to become erythematous from pressure, that it ought always to be examined at this period twice a day. At first it may be mitigated for some days by altering the pressure with pillows, and by frequent anointing the parts, either with a liniment of equal parts of white of egg and rectified spirit agitated together, or with a lotion of equal parts of opium and acetate of lead in one hundred parts of water; and many sore backs may in this way be saved, by simply delaying the progress of the erythema for a day or two, till the crisis which is approaching shall be formed. But these remedies are only palliative if the fever continue long; and sloughing in that case almost invariably follows. When gangrene has formed, the best remedy is the turpentine liniment covered with a poultice. Erysipelas may sometimes be successfully treated by small nauseating doses of tartar emetic, especially if administered early in the attack. Other remedies for this disease in its idiopathic form are seldom of service; and indeed it is on the whole an intractable disease in fever. Phlegmasia dolens is best treated by free local evacuation of blood, and warm fomentations;—and, if suppuration take place, by graduated pressure.

A few special symptoms in the middle stage require attention. Sleeplessness is often grievously complained of by those patients who do not fall into a state of torpor, or into the opposite condition of riotous delirium. Sometimes their complaint is imaginary; but, where real, advantage is often found in meeting it by the administration of opiates. Opiates are chiefly useful in two states,—when there is sleeplessness without delirium or tendency to stupor, and when there is restless delirium in concurrence with a soft pulse, and the general signs of exhaustion. In either case the criterions which are favourable to their employment are a pulse compressible and not jarring, no great flushing of the face, freedom of the conjunctivæ from particular injection of vessels, and a soft tongue neither much loaded, nor very dry and brown. In most circumstances where opiates are serviceable, they disagree if too often repeated. The best signs of their administration having been judicious are quiet sleep with refreshment on awaking, and a moister state of the tongue. If they produce more delirium, or no refreshment, notwithstanding that sleep was their imme-

diate effect, or if the tongue become more dry and brown, they should be abandoned.

A symptom not uncommon in the middle stage, especially in cases occurring among young adults of the better ranks, is an excessive disposition to leave the bed and roam about. This tendency should never be controlled by too violent measures. If it cannot be prevented by gentle resistance, it is often effectually put an end to by occasional indulgence. The straight waistcoat, which many heedlessly resort to, should be reserved for those cases only where the tendency is accompanied by violence or furiosity, and must be combined with the cold douche of the head. The patient ought never to be left alone, when there is this tendency to quit his bed. Syncope may be induced by efforts to accomplish what is beyond his strength; or fatal accidents may arise, from his reaching an open window or a stair-case. So many attempts, some of them unhappily successful, have been made of late by young people in fever in Edinburgh to leap their windows, that this form of delirium is probably either communicated by example, or suggested by the precautions seen to be taken against the danger.

A very inconvenient and common symptom in the middle stage of typhoid fever is tympanitic distension of the abdomen. In severe cases it is scarcely possible to remove it until a crisis take place, and then it promptly disappears without any remedies. The most useful treatment consists in the occasional administration of stimulant and carminative clysters. Purgatives by the mouth often increase it, unless where the bowels have been neglected in a state of constipation. Another very inconvenient symptom is distension of the hypogastrium from retained urine. This affection is so common in the middle and final stages of bad cases of typhus, that the practitioner should always make inquiries into the state of the urinary secretion, or daily examine the region of the bladder. It may be removed sometimes by stimulant clysters; but the catheter often becomes necessary.

Treatment of the final stage. By the final stage is here understood the short period, commonly of two or three days at farthest, which usually precedes a fatal event or a favourable crisis, and also that which constitutes the period of crisis. A distinct head has been made of this interval; because, when it has fairly arrived, the time for every sort of treatment is generally past, except what consists in supporting the patient against primary and secondary exhaustion. There is good sense in the quaint indication laid down for the treatment in the final stage of fever by authors at the close of the last century,—namely, to counteract the tendency to death. When the disease has reached thus far, it seldom continues long; it has a natural limit in the generality of cases; and if the patient can be kept alive for a few days—for example, beyond the seventeenth day, he will for the most part recover, where no serious secondary disorder threatens life. During this important period little is called for in a great proportion of cases, except the faithful administration of the stimulants which have previously been found of service; and when an improvement occurs, it is commonly right to abandon opium, if it had been previously given as a calmative and hypnotic; to countermand counter-irritants or local evacuants; to be on the watch for the period when general stimulants should be reduced; and to offer small quantities of simple articles of food. Laxatives should also be given sparingly, and clysters commonly administered in preference. Much attention must be paid to erythematous parts, and those which were injured by the employment of counter-irritants. Careful inquiry must always be made into the state of the urine, lest retention secretly accumulate to a dangerous degree.

Treatment of convalescence. The management of convalescence from fever is directed chiefly to two objects, the restoration of the strength, and the prevention of relapse.

For the attainment of the former object, it is necessary to continue the use of stimulants, and gradually to enlarge the allowance of food. In the generality

of cases the quantity of stimulants must be reduced when convalescence is fairly established. They can seldom be dispensed with altogether; but the large and frequent doses administered advantageously throughout the earlier periods of fever are often observed at this time to cause marked reaction and even a return of the febrile symptoms, more especially frequent jarring pulse, dry brown tongue, flushing of the face, and disturbed sleep. In some instances, however, convalescence is attended with an extraordinary tendency to fainting in concurrence with constant general depression; and here not only must stimulants be employed largely, but likewise they must be continued very frequently and with great regularity, otherwise the patient may perish in a state of deliquium. As to food, at first simple farinaceous articles and in the pulpy form are alone admissible; afterwards more substantial articles of the like kind, but without fatty or aromatic seasonings, are allowable; weak soups come next into requisition, and then eggs, or white fish with some simply sauce. Here the physician may pause for a time, before allowing solid animal food. When this is to be allowed, the broiled or roasted flesh of adult animals ought to be given in preference to chicken, veal, or lamb, which many absurdly prescribe at first under the notion that they are more digestible. To the generality they are quite the reverse. In respect of the precise time for these changes and their exact amount, special circumstances in each case must invariably be the criterions. But the following rules should be constantly kept in view:—that the appetite shall always precede the supply by a day or two; that much excitement after meals shall involve a diminution of allowances; that in the case of the young, the meals shall be more frequent and more scanty than in adults; and that a foul tongue or disturbed sleep is a sign of too abundant a supply.

Some convalescents sleep almost constantly for some time. This is particularly observed of children. Many adults on the contrary are much harassed by night-watching, do not sleep above three hours in all daily, and have their slumber in short broken snatches, which render the night extremely burdensome. Where exhaustion is thus occasioned opiates are highly proper. But more commonly the patient is well refreshed with what sleep he does get, or is at once renovated by breakfast. In that case opiates are hurtful, and he must be content to watch till exercise restore natural sleep; which will speedily happen when he is able to go out of doors.

The most effectual preventive against relapse is the cautious regulation of the diet in the manner already directed. For the most frequent cause of relapse is some error in diet, particularly premature abundance of food; and the usual manner in which the relapse is established is by the *febricula* which follows digestion being prolonged into confirmed pyrexia. Premature exposure to atmospheric vicissitudes, or inconsiderate fatigue, may have the same effect, and should therefore be guarded against. Exposure to atmospheric vicissitudes, however, is more apt to occasion acute local inflammations than relapse; and of the affections thus induced, neuralgic rheumatism, pneumonia, catarrh, and peritonitis, are the most frequent. It is singular that convalescents from fever often retain for some time the same insensibility to cold which characterises for the most part the state of fever itself. Some, on the contrary, are unusually alive to the impressions of cold, and these ought to be carefully protected against it. But many undoubtedly show for a time a power of enduring cold which is very surprising, and which protects them against the risk of local inflammations as well as of relapse. All convalescents from fever are apt to suffer most from cold during the night; and it is at this time that local inflammations, especially rheumatism, are most commonly excited.

The prophylaxis of, Continued Fever. As it has been shown, in a previous part of these remarks, to be not improbable, that the infection of fever is not active or malignant in the generality of cases, it follows that much may be done by preventive means to lessen its dissemination. Independently of all theory in the matter, the extreme rarity of its propagation in the families

of the middle ranks, where no doubt can exist of its having been introduced by infection, contrasted with the certainty of its diffusion in the families of the poor, or in fever hospitals, furnishes ample evidence how much may be accomplished by a skilful prophylactic system.

The principal rules to be observed are the following: — The sick ought to occupy a spacious apartment capable of being easily ventilated. In hospitals, fever wards ought to be far more spacious than they usually are in this country; and they should have not less than twice the cubic contents of general wards. With the condition of free ventilation secured, complete separation in a family is not absolutely essential; all unnecessary intercourse with the sick should, however, be of course avoided; and in the case of the lower orders, where space and ventilation can scarcely ever be attained, intercourse should be strictly limited to the personal attendance required for the patient's wants. The bed-clothes should be frequently changed; and all unnecessary curtains and hangings removed from the apartment. Fumigations, once in universal use, are now generally abandoned; but unjustly, for they cannot fail to prove beneficial, either by their direct power of destroying animal effluvia, or by necessitating subsequent ventilation; and hence, in the houses of the poor at least, they should be practised once a-day if possible. Chlorine or nitric acid is most easily borne, and most readily obtained; the former from milk of chloride of lime and sulphuric acid, the latter from nitre and sulphuric acid, aided in their chemical action by moderate heat. The personal attendants of the sick ought not to be young people; for it has been seen above that the chance of the disease being communicated is, after thirty years of age, one half what it is at twenty, and only one third at forty. It is of course desirable to have attendants who are in some measure fortified by having had fever; but this security is seldom attainable. All unnecessary approach to the close vicinity of the sick should be avoided; and where a very close approach is inevitable, more especially when the bed-clothes are raised, the concentrated effluvia from the body should be avoided for a few seconds, or the respiration suspended for a little, so that the emanations just let loose may become somewhat disseminated. Frequent change of the attendants is desirable; and all excessive fatigues, particularly in night-watching, must be shunned. The diet of the attendants should be good, and long fasts carefully guarded against. Advantage is probably derived, especially in the case of medical pupils, from vigorous exercise in the open air immediately after any unusual exposure to infection.

PLAGUE.

Characteristic symptoms. — Varieties. — Simple or glandular. — Eruptive. — Malignant. — Sequelæ and complications. — Anatomical characters. — Diagnosis. — Prognosis. — Statistics. — Nature. — Causes. — Prophylactic measures. — Treatment.

The plague, or pestis, of Cullen is a disease almost exclusively of eastern occurrence, for though it may occasionally extend rapidly to more distant parts, yet Egypt and the neighbouring countries appear to be the proper and more frequent seats of its devastations. This disease has been variously defined by different authors; the most applicable definition is that offered by Dr. Brown: — "An exanthematous disease, the eruption consisting of buboes, carbuncles, and pustules, white, livid, or black, and generally attended with malignant and very fatal fever." (*Cyc. Prac. Med.*, art. Plague.)

Symptoms. It is a remarkable fact in the history of plague, that no very marked *premonitory* symptoms precede its attack: judging from the analogy of other exanthematous fevers, it might have been anticipated that a disease

so appalling in its nature, and so frequently fatal in its consequences, would have been preceded by some kind of warning. This is, however, not the case; at least such appears to be the impression of those who have enjoyed the greatest opportunities of watching the whole series of phenomena attending its occurrence. Sir A. B. Faulkner (*Edin. Med. and Surg. Journ.*, vol. x.) says, that "the suddenness with which plague attacks its victims is altogether incredible, persons being known to enjoy every appearance of good health a few minutes before its attack;" and Bulard, who is the most recent writer on the subject, says distinctly, that "plague has no premonitory signs." (*Dublin Med. and Surg. Journ.*, vol. xiii.)

The first stage of the disease commences generally by a not very distinct rigor, attended by a sense of much weariness and lassitude, immediate depression of spirits, pain and weight of the head, with sudden attacks of giddiness and dull throbbings. The countenance assumes an expression of exhaustion and anxiety. The eyelids are half closed. The eye is downcast, dull, and sleepy; the mouth half open, expressive of weakness and feebleness of purpose. There is an indescribable feeling of anxiety about the præcordia, extreme restlessness, not from this cause only, but from absolute pain referred to the heart itself. This is occasionally so considerable, as to become urgent in the extreme: sometimes there is shuddering, nausea, and vomiting. As this first stage advances, the gait becomes staggering and uncertain, not unlike that of a drunken man. This weakness rapidly increases, until at length there is total inability of either walking or standing. The head sinks upon the chest, and the patient seems unable to raise it. The whole muscular system appears to be powerless and relaxed. The patient not unfrequently feels faint, but very rarely passes into a state of syncope. In other fevers this symptom usually occurs late in the disease and on the patient's sitting up, whereas in plague this position seems less to produce it than the horizontal; nor is it so soon recovered from in this posture as in other fevers. (*Russell on the Plague*, p. 89.) The eyes become more dull and sunk; the complexion opake and dingy; and the haggard character of the countenance is greatly increased, the fixed anxiety of its expressions being only interfered with by twitchings and convulsive movements of the features. The skin is hot, dry, and harsh to the feel. The præcordial pain, as well as that in the heart itself, become more intense and more circumscribed. The vomiting, which now usually takes place, though it is seldom of a green colour, is for the most part bilious; sometimes, however, it consists merely of the fluids which have been taken. The tongue is swollen (a very marked symptom of plague), covered with a white fur, which towards the centre glistens like mother of pearl; towards the tip and edges it is moist and clean. The pulse is accelerated, small, and contracted. Bulard describes it as miserably small, beating from 115 to 130: sometimes, however, it is not more frequent than natural. The respiration becomes laborious, short, and hurried; and although the voice is not altered, the speech is thick, indistinct, and faltering. Darting pains are now felt in the axilla and groins, as well as in other parts of the body. On examination these are found to be connected with swellings in the neighbourhood: should these swellings have their seat in the glandular system, they constitute the bubo; should they be in the muscular or submucous tissue, they are the carbuncle; both of which, when taken in conjunction with the other symptoms, are characteristic of the existence of plague. These usually present an inflammatory appearance, being, in the more favourable cases, of a bright red colour, and of a livid or purple in those of a more dangerous aspect. The bowels are confined, and not easily acted on by medicine. The urine is high-coloured, scanty, and sometimes entirely suppressed.

This first stage, which usually lasts for about twelve hours, is succeeded by the *second* essentially one of reaction. The patient becomes more agitated, and is incessantly changing his posture, in the vain hope of relieving the urgent pain that oppresses him. Russell (*op. cit.* p. 88.) says, that, "when

asked where the pain lay, the patients either answer hastily, 'they cannot tell,' or, with a fixed wild look, exclaim 'kulbi! kulbi!' (my heart! my heart!") Should sleep be attained, disturbing dreams render it unrefreshing. The mind is unsteady and wandering, but delirium is very rarely observed, the unsteadiness of the intellect, which becomes particularly marked during the febrile exacerbations, subsiding into simple confusion during the frequent intermissions that take place. Sometimes this state of mind alternates with coma—a condition which argues a severe form of the disease. The patient is impatient of being asked questions about himself; and even when the power of reply remains, which sometimes is not the case, refuses to answer. Besides the functional impediment in the speech which has been noticed, there may be observed, as the disease advances, trembling of the tongue, this symptom rarely occurring, however, until the patient has been ill for two or three days. The countenance now assumes a peculiarly confused expression. In addition to its dull, heavy, and haggard appearance, it becomes lively and excited. The eye still retaining its muddy aspect, is yet strangely mingled with an unusual lustre; the pupil is very much dilated. This state of the eye continues independently of any remission in the symptoms. The pulse becomes hard and full, but not increased in frequency; sometimes however it is so low, as to be scarcely perceptible; at other times it is fluttering and intermittent. The tongue is now much increased in size, dry, parched, and of a yellowish colour, with a red streak down the centre and at its edges; then brown; cleft, and like horn (*Bulard*); but it never acquires the thick fur and the black colour so often observable in other malignant fevers. The teeth, lips, and lining membrane of the nose, however, are coated with dark sordes resembling soot. This, as it dries, assumes the form of powder, and falls off. The pain in the stomach, which is intense, is aggravated by the occasional vomiting of a blackish coloured fluid; sometimes there is distressing nausea, which no vomiting, either spontaneous or artificial, appears capable of subduing. The state of costiveness which prevailed at the onset of the disease, is now superseded by a tendency to a relaxed state of the bowels; the evacuations are black and offensive, though less so than in fevers of the typhoid character; occasionally they are mixed with blood, and passed involuntarily without pain; in other cases they consist almost entirely of a dark grumous fluid. Not infrequently hæmorrhage takes place from other mucous surfaces; most frequently, according to Russell, from the nose and uterus. Generally speaking, if the loss of blood be considerable, fatal results are the consequence, especially if it occur at the advanced period of the disease. Should the hæmorrhage, however, proceed from the nose during the first moments of reaction, there is not much cause of alarm. The uterus appears particularly excitable during plague, catamenial hæmorrhage often supervening upon the other symptoms. In case of pregnancy, abortion with its evil consequences is almost certain to occur.

Perspirations frequently take place—a symptom which experience proves to be of the highest importance in controling the character of the disease; in fact, of all the excretions, this seems to be the most important in its effects. When there is suppression or deficiency in this respect, the worst consequences may be anticipated; while on the other hand, if a free and open perspiration supervene upon the dry hot skin, and a remission in the symptoms follow, it is almost certain that the crisis has taken place. This favourable result usually occurs in an early period of this, the second, stage. and is characterised by a general abatement of the excitement; by the pulse falling to about eighty or even seventy, maintaining, at the same time, a steady open character; by the expression of the countenance becoming more natural, the eye more clear, the conjunctiva losing its injected appearance, the pupils being no longer dilated; in short, by a general amelioration in all the symptoms, while the buboes enlarge, become more active, and suppurate, or the carbuncles suddenly appear with broad surfaces, sometimes to the extent of four or five inches. Should, however, the disease assume a fatal tendency, the general surface of the skin

remains dry and harsh, while the face and hands perhaps are covered with a cold sweat; the pulse becomes small, fluttering, and almost imperceptible; there is constant low muttering delirium; the breathing is hurried and laborious; the eye sunk, so that the countenance has a ghastly expression; and the skin covered with petechiæ and vibices, though the buboes and carbuncles are not fairly developed. The powers of life are now evidently giving way, and death generally ensues without a struggle, though Sir A. B. Faulkner* says that "death very rarely follows a gradual extinction of the powers of life; in the greater number of cases it is ushered in unexpectedly by some violent delirious effort, or suddenly terminated in convulsions."

Such are the usual symptoms of the more common form of the disease; many variations however occur, but before we enter upon a description of these, it is necessary to make a few observations on some of the leading symptoms of the disease.

The bubo, which forms so prominent a feature in all histories of the plague, is a glandular inflammation. The glands most usually affected are the inguinal and the axillary; in fact, with the exception of the parotid, maxillary, and cervical, which are occasionally inflamed, the glands in other parts of the body are seldom implicated. The two latter, indeed, are rarely enlarged, unless in conjunction with the parotid gland, or there be some carbuncular eruption in the vicinity, so that the glandular affection appears rather to be the result of a local irritation, favoured by a predisposition to glandular inflammation, than an element of the disease. Even under these circumstances, they scarcely ever pass into suppuration. The parotid is most frequently affected in children. They increase more rapidly, acquire a larger size, and are harder than other buboes; at the same time they are more indolent, and disperse very slowly. When suppuration takes place it is superficial, little of the glandular structure being destroyed. The great size which they occasionally attain without suppurating appears to produce suffocation, and in this manner to be the immediate cause of death.

The first indication of the formation of a bubo is an occasional darting pain in the immediate region of the gland: there are no external signs of its existence until some hours after, when a deeply seated hard round tumour, evidently movable and painful on pressure, becomes perceptible. The integumental covering is at first in no way discoloured. As the bubo increases, which it may do in the course of two or three days, the acute pain assumes a heavy obtuse character, excepting in those of a very irritable disposition. The swelling becomes visible to the eye, and on examination is found to be of an oval form, and in great measure immovable. The skin, though thickened, does not show any signs of inflammation, until the bubo has existed eight or nine days; it is then tense, painful, and discoloured. During the next ten days the signs of its progressing to suppuration are evident; on the fifteenth or twenty-second days the tumour becomes flattened, and an external opening takes place through the discoloured integument, by which the matter is discharged. A slow healing process then ensues; and finally, on recovery, a scar is left, the appearance of which is never obliterated. Occasionally, however, the course which a bubo runs is much more rapid; when this is the case a fatal termination may be anticipated. (Russell, *op. cit.*, p. 115.) On the other hand they often disperse gradually, and are ultimately wholly absorbed. A circumstance which takes place, apparently very frequently, is the alternate rising and subsiding of the bubo; one day it looks prominent, another day it appears to have receded entirely, or at least to be much diminished: though there can be no doubt that this is sometimes really the case, yet more frequently it is merely in appearance, and seems to depend on some change in the superficial integument, for, on more minute examination, the subjacent gland will be found unaltered.

Besides these, which are the true plague bubo, authors describe the *accessory*

* Edin. Med. and Surg. Journ., vol. x.

and the *spurious*. The accessory buboes (unlike the bubo, whose course has just been described, and which occurs at the onset of the disease), do not make their appearance until after the disease has fully set in, the period varying from some hours to many days; in the latter case it is generally observed that an exacerbation of fever attends their formation. The spurious bubo, which has been particularly described by Russell, is a small hard subcutaneous swelling, rarely making its appearance before the third day. It occurs on nearly all parts of the body. In its early stage it appears to be fixed, but the superjacent skin, unless inflamed, can be moved over it. It is not so painful as the true bubo, nor does it suppurate so rapidly. The integument retains its natural colour until the sixth or eighth days, when the swelling becomes considerable and protuberant, differing in this respect from the carbuncle or erysipelatous phlegmon. Excepting on the scapulæ and back, where they occasionally acquire a very large size, they rarely exceed that of an ordinary hen's egg.

The carbuncle rises first as a vesicular eruption, of a roundish shape, and slightly protuberant. The upper surface is of an uneven, wrinkled, greyish appearance, and contains a dusky yellow or blackish fluid: on this being discharged the surface beneath has an inflamed aspect, with a dark gangrenous spot in the centre: this usually takes place on the third day. As the carbuncle advances, it becomes of a livid hue, surrounded by an angry state of the integuments; its centre forms a gangrenous crust, which gradually extends and covers over its whole surface. In those cases which terminate fatally, this crust remains dry; but if a favourable turn in the symptoms take place, matter is formed beneath, by which it is separated and thrown off, exposing a deep and unmanageable ulcer. This is the more usual form of carbuncle: authors have, however, described many varieties. As these differences involve much minute description, and are of no essential service as regards prognosis, we shall not dwell upon them here, but pass on to their general history. When these eruptions occur, they do so generally in connection with buboes. They are often very numerous, usually appearing in the more advanced periods of the disease, but never later than the eighteenth day; sometimes however they make their appearance on the first day of the fever. The whole external part of the body seems liable to them. It has not unfrequently been observed, that, on carbuncles occurring on the hand or arm, sympathetic swellings of the glands of the axilla take place: this also, though more rarely, occurs in the glands of the groin, when the leg or foot have been the seat of the carbuncular inflammation. In these cases, however, the buboes are less painful, and altogether of a different description from the primary bubo. If the carbuncle pass into a kindly suppuration, they subside gradually and entirely. Occasionally, during the progress of the plague, common boils occur; which, though at first resembling some of the varieties of carbuncle, are evidently not identical. They rise suddenly to a point, and pass rapidly into suppuration.

Petechiæ are not very common; they usually occur in the form of small, dusky red, or pale purplish spots, not unlike fleabites, which, as the disease progresses, acquire a livid hue. They are not numerous, and are situated at some distance from each other. They rarely appear unless at a late period of the disease, and then only when the symptoms assume a peculiarly low putrid character. The skin covering the breast and mastoid muscles is their more usual seat.

Purplish spots* and streaks make their appearance sometimes separately,

* It is very difficult to determine whether these maculæ or the carbuncle constituted the *plague token*. In the descriptions which the old authors give, they frequently name characters proper to both. As far as general description goes, we should have no hesitation in saying that the carbuncle was the true token. Thus they are described "as originating in little pyramidal protuberances, having the pestilential poison chiefly collected at their basis:" besides, they are spoken of as being surrounded by a blue or blackish circle, or putting out blisters. Yet at the same time the chief test of the token is said to be absence of pain even when pierced with a needle, which certainly is not the case with the carbuncle. The probability is, that the eruptions generally were viewed as the tokens of plague.

sometimes together: authors have described the former under the name of *maculæ magnæ*, and term the latter vibices. They are essentially the same eruption, only varying in shape, presenting in one case the character of a bruise after a blow, in another of a bruise after a stripe or lash. They are often not observable until death has taken place; when they make their appearance before, they are the forerunners of this event. Of the same character also are lengthened narrow streaks, of a livid or reddish purple colour. These lines frequently occur on the face, to which it gives a hideous and altered expression, so altered that patients under such circumstances can rarely be recognised by those most intimately acquainted with them. Besides these, eruptions of an evanescent character occasionally take place. Sometimes the integument assumes a variety of dull colours; different shades of blue and red giving to many parts of the surface a mottled appearance not unlike marble. This eruption often vanishes suddenly, and again makes its appearance; occasionally before death it assumes a more permanent character; in other cases it amounts merely to an erysipelatous appearance, which, after remaining for a short time, disappears and does not return.

Russell has given in his history of the plague a series of tables deduced from 2700 observations on plague cases, which show the relative frequency with which these several eruptions occur. From these tables it appears, that of the eruptions the inguinal buboes are the most common, exceeding the axillary by more than two thirds, and exceeding the carbuncles in a still greater proportion. The parotids bear but a small proportion to the inguinal buboes, and are chiefly incident to children and to the youth of either sex. Spurious buboes are comparatively very rare. It further appears, that the simple inguinal bubo affects the right groin more than the left, in the proportion of 729 to 589; and that they occurred in both groins in one eighth of the cases. Axillary buboes are also rather more frequent on the right side than on the left, but the difference is inconsiderable. Their occurrence in both sides is rare, for, in 358 cases, only nine instances were observed. Parotid buboes very rarely occur, unless complicated with other eruptions; and the carbuncles still more so, though these latter in combination with buboes are not unfrequent. The spurious bubo, which does not very often make its appearance, is met with as frequently by itself as in conjunction with other eruptions. The most frequent complications met with are carbuncles with buboes.

Bulard arranges the varieties of plague, and deduces his diagnosis, from the different complications of these eruptions. He says, that in all cases the following diagnostic symptoms occur, either singly or collectively: —

1. Knotty tumours of the lymphatics in the groins and axillæ, rarely in the neck, and still more rarely about the knee.

2. Petechiæ in the thorax, the neck, and sometimes over the whole surface of the body, rarely on the limbs.

3. Carbuncles in greatest number upon the limbs, but seldom upon their extremities, or upon the face, or trunk of the body.

During the prevalence of plague in 1834 at Cairo, and particularly at Smyrna, he states that these three morbid appearances have constantly indicated three different forms of disease: — the simple, where buboes alone occur; that in which buboes and petechiæ occur together; and that in which buboes and carbuncles are united. He has never observed the two last forms occurring together; that is, he has not met with cases in which there were at the same time buboes, carbuncles, and petechiæ conjoined.

We shall conclude this short description of the peculiar symptoms of the plague by a few observations on the state of the blood. This fluid, on being drawn from a vein, flows easily and in a continued stream. In the *Traité de la Peste* it is however described as a viscid semifluid substance, not springing out like healthy blood, but trickling slowly like muddy wine-lees or even treacle. In no stage does it ever exhibit the buffy coat; nor, according to

recent observers, is it ever of greater consistence than in health. It has a peculiar odour, and is of a dark red colour, which never changes, as is otherwise the case, into a bright red; on the contrary, after standing for a time, the general mass assumes the tint of a violet red, becomes cupped, and has a red coloured serum floating in its concavity. Sometimes, however, it shows no disposition to form a coagulum, but remains quite fluid, of a livid colour, exhaling a strong odour, which appears to proceed from drops of an oily looking fluid floating upon its surface. On analysis this blood has been found to contain in 100 parts the following ingredients: —

Coagulum,	Water	35·576
	Fibrin	·624
	Colouring matter, with some fibrin, albumen, and fatty matters	3·800
Serum,	Water	54·420
	Albumen and colouring matter	4·704
	Extractive matter	·252
	Chloride of potassium and sodium	·408
	Carbonate of soda and fatty matters	·216
	Sulphurous acid	traces.

After death the blood is found in the arteries in small quantities; it is as black as in the veins, fluid, and seemingly decomposed. In the large venous passages there is often found floating in it the oily looking substance, which is discharged with it during life.

Varieties. Having now given a general outline of the more prominent and characteristic features of plague, we shall take a short review of the different forms in which this disease is found to occur. For the sake of brevity these may be referred to one of three divisions. 1. *Simple or glandular* plague; 2. *Eruptive* plague, attended by a period of reaction; 3. *Malignant* plague, in which the period of reaction is either entirely absent, or but very imperfectly developed.

1. The *simple* or *glandular* form of plague is rarely fatal in its termination, and but seldom characterised by any very urgent symptoms. Sometimes indeed it is so slight an affection, that only very moderate, or even no febrile symptoms are developed. The patient may feel himself slightly indisposed for two or three days, but not to such an extent as to render confinement to bed, or even to the house, necessary. He is enabled to perform his ordinary occupations unembarrassed by the very slight mental excitement and other symptoms that may be present. The buboes, which are almost the only decisive evidence of the existence of plague, go on kindly and speedily to suppuration. Persons thus affected are often known to walk about and pursue their accustomed avocations apparently in good health, and without expressing any inconvenience from the buboes.

In other cases there is evidently a febrile excitement, which, though sufficiently well-marked, is neither of long duration, nor very urgent. For the first two or three days there is general nausea, loss of appetite, disinclination and some inability to use exertion, the skin is dry and hot, especially at night, with restlessness and some degree of excitement, which scarcely ever amounts to delirium. The pulse is accelerated, full, and bounding; there is urgent thirst; the eye, though bright, has not the singular glistening appearance that has been alluded to; nor has the countenance the bloated drunken character so generally seen in the severer forms of plague. After these febrile symptoms have continued for a few days, they subside upon a perspiration taking place; but, towards the evening of the day on which this may have occurred, they are renewed, to be again relieved by another perspiration towards morning. These nocturnal exacerbations and morning remissions often continue for a week, or even for fourteen days, before recovery may be said to be established. During this period the buboes pass through their several stages in a regular steady manner; they are attended with rather more pain than when the febrile symp-

toms are not so marked: if situated in the inguinal region, as they most generally are, they may from their locality so inconvenience the patient as to prevent his walking, when such inconvenience would not be the consequence of the constitutional derangement simply. Occasionally, though not very frequently, carbuncles occur in this slighter form: they however quickly crust over, the crust soon separating by the kindly secretion of pus, the result of a healing process, which is quickly followed by the wound becoming sound.

2. The *eruptive* form of plague, attended by a period of reaction, is of more frequent occurrence than any of the other varieties. It includes, in fact, by far the greater proportion of cases that occur. Their ordinary history is, a febrile paroxysm at night of some severity, followed by a morning remission, which is preceded by a state of diaphoresis more or less marked. Towards midday an accession of febrile symptoms recurs, though not so intense as those of the previous night; these are again followed by a remission, which is likewise superseded by the more severe nocturnal paroxysm. This variety of plague is particularly distinguished from the other two, by the pulse being fuller; a character which it maintains in the early stage of the disease, and by the power of reaction when any unusual severity in the form of the disease may have particularly depressed the system—a state which not unfrequently occurs at the commencement of the nocturnal exacerbation; in fact, all the symptoms point out, that this form is more inflammatory than the simple or glandular, and that the system is endued with a greater power of resisting the malignant effects of the plague poison than the adynamic variety. It is also characterised by a tendency to critical perspirations on the third, fifth, seventh, or subsequent odd days.

The series of symptoms attending this form of plague may be stated to be as follow:—It commences in a well-marked though by no means severe feverish attack; there is some degree of restlessness, an excited pulse, nausea, and vomiting of bilious matter, with most probably the appearance of one or two buboes, and perhaps of a carbuncle, of which there are often a succession as the disease progresses. Though the mind may, at the onset, be a little agitated, there is never delirium or coma. The symptoms sometimes assume a slight degree of intensity; but it is very remarkable, that whatever be their character, whether more or less severe, no judgment can be formed as to the future course of the disease: it is often found that the severest symptoms have supervened when the commencement has been mild; and at other times, when this first stage has been peculiarly violent, a mild form of plague has succeeded.

On the subsequent, that is the second, day, a remission in the symptoms usually takes place, sometimes attended by diaphoresis. The heat of the surface is moderated, the pulse abates in frequency and force, but does not acquire a character which can be called small. There is not, however, a perfect remission, much headach, pain in the buboes, and nausea, being felt; there is very rarely vomiting, for though this is a symptom which is pretty constant on the first day of attack, it rarely recurs afterwards. As the day advances a return of the fever takes place; it is not however preceded by any rigor, nor indeed by the least sensation of chilliness. It is in truth scarcely to be called a paroxysm, but rather an increase, of the febrile condition which prevails during the remission. The pulse rises, but remains soft; the heat of surface is moderate; the thirst urgent; the tongue moist; there is much restlessness, and the functions of the brain are evidently affected, shown by confusion of intellect or disposition to coma. Towards evening a partial perspiration breaks out, after which these symptoms abate considerably, the patient complaining of more general indisposition, anxiety about the præcordia, and feeling of oppression, than during the morning remission. As night advances the true febrile paroxysm ensues: the patient becomes very restless, suffers from a sensation of intense heat, the skin being perceptibly to the touch of a high temperature; the pulse is quick and feeble; the eye muddy, and the countenance

generally acquires the drunken expression so remarkable in plague; and, in addition to a state of the most distressing bodily weakness, there is transient incoherence alternating with coma.

As the morning of the third day advances, in the more favourable cases a profuse perspiration ensues, which is often critical, being followed by a marked remission, and immediate relief of the symptoms: the pulse becomes open, soft, and less frequent; the restlessness and thirst diminish; the intellect is more clear; and altogether there is decided amendment. Towards midday there is slight febrile exacerbation, which, though somewhat severe, is by no means protracted, for, after a very short time, a remission takes place; this continues till nightfall, when another exacerbation ensues, characterised by a greater power of resistance in the system than during the exacerbation of the previous night; the pulse is stronger and fuller, while the coma and wandering delirium abate. On the following morning (that is, the morning of the fourth day), the perspiration is not so copious, nor attended by so complete a remission as on the previous day; it does not, in fact, in any way come under the denomination of a critical sweat.

The exacerbation which takes place towards the middle of the day is moderate, while that which comes on at night is very severe, more so by far than the exacerbation of the previous night. On the morning of the fifth day another critical sweat breaks out; this is the commencement of a very decided remission, which is followed by an exacerbation in every respect milder than any that have preceded it. There is now evidently an abatement of the symptoms, and though they may continue somewhat in this order for a week longer, yet they daily decrease in intensity, so that, after the second week, their force has so far subsided, that the patient may be declared to be in a state of convalescence. During this time the buboes run a steady course to suppuration, and the carbuncles form very early a crust, which is soon removed by the healthy granulations that ensue.

Such is a history of the more favourable cases of this form of plague. In those where the symptoms assume a more severe character, it is found that, on the third and fifth days, the critical perspirations either do not take place at all, or are but very imperfectly marked. Instead of the symptoms remitting, or the system showing powers of resistance adequate to repel the noxious influence of the disease, a more alarming state of things comes on, and the eruption of vibices and petechiæ is superadded to the buboes and carbuncles. As a general rule it may be said, that, when buboes and carbuncles alone are present, a favourable termination may be anticipated; when buboes and petechiæ occur together, the result is generally unfavourable, especially if there be superadded diarrhœa, hæmorrhages, and loss of speech. It is, however, a very capricious disease: occasionally the most urgent symptoms, to all appearances, are followed by a favourable termination; while at other times, apparently the mildest cases are suddenly cut short by death. Not above one half of those affected with this form of plague recover.

We have previously alluded to the frequency of menorrhagia in plague, as well as to the fact that, when pregnancy exists, abortion almost invariably takes place. Russell makes the very curious remark, that women under these circumstances generally die on the seventh day. He says, that he once met with an instance of a pregnant women dying on the third day, but in general the seventh was the fatal period; some very rarely struggled on till the eleventh.

It may not be inapposite here briefly to sum up the characteristics of the two forms of this our second division of the disease.

The slighter has more the character of ordinary fever; the shivering and succeeding reaction are more marked, and the stomach is disordered to vomiting:—this condition, unattended with any thing like coma, remains during the illness, the fever throughout the whole time never ceasing, though not unfrequently remitting. The buboes and carbuncles generally make their appearance on the first day, and pass on kindly through their various stages. Gener-

ally speaking the third morning is critical: if a remission of the general febrile symptoms ensue, with free perspiration, a favourable termination may be expected; if however this should not be the case, but the skin hot and dry, with drowsiness, low muttering delirium, quick small pulse, muddy glistening eye, and considerable jactitation, danger is to be anticipated: this condition however may continue for a fortnight before the patient sinks.

The severer form, which is much more fatal, begins generally with a slight shivering and sense of cold, and is soon succeeded by the usual symptoms of fever, accompanied by vomiting and purging. The fever increasing towards night, the face becomes flushed, the eyes glisten, and the patient is either delirious, or more or less comatose. During the succeeding days, at every exacerbation these symptoms increase; the pulse becomes rapid and more or less full; the eyes have the peculiar and characteristic muddy appearance; there is a confused expression of countenance, with pain, heat, and oppression about the præcordia. From three to six days is the period in which these symptoms run their course. The buboes do not in general make their appearance until the second day, and but rarely suppurate: experience has shown, however, that they do not influence the termination of this form of plague, for, even if they do suppurate, few so affected recover.

3. The third and last division of plague, which may be denominated the *malignant*, and in which the period of reaction is either entirely absent or but very imperfectly developed, usually sets in with chilliness, vomiting, sudden loss of strength, headach, confusion of ideas, giddiness, and oppression of spirits; death sometimes takes place rapidly, occasionally within the short space of twenty hours, and even before decided characters of dangerous illness are apparent; for, if the febrile symptoms are but slightly developed, the disease may be considered to have assumed its worst character. In this rapid form, death ensues before buboes or carbuncles appear. In other cases there are, for a few hours, some symptoms of reaction, and signs of more general disorder become evident. This usually occurs towards night. The eyes lose their lustre, become muddy, staring, and excited; the expression of the countenance is haggard; in some, immediately before the accession of the more violent symptoms, it assumes an appearance of despair and horror, which baffles all description, but can never be mistaken by those who have once seen it; much distress is felt not only in the cardiac and præcordial regions, but in the heart itself, which is much aggravated by the vomiting that is often constant; the thirst is urgent, but the tongue is moist. The pulse, though often natural, is for the most part soft and quick, though it occasionally acquires some degree of strength and fulness; this however is very rare. The skin remains cold, or if it acquire any increase of temperature, it is but for a short time, flushings of heat passing partially over the surface; the power of utterance is lost or very much impaired; the patient is generally in a low, drowsy, lethargic state, but conscious, when roused, though there is a disinclination to be disturbed. Occasionally this state is disturbed by transient fits of delirium. It is in fact sufficiently evident, that the brain and nervous system are seriously affected. Towards morning the symptoms abate, and the unsteadiness of mind is greatly recovered from; at any rate, in the majority of cases, attacks of delirium no longer occur. Russell says, that when patients had been delirious in the night they usually recovered their senses in the morning, though sometimes disposed to ramble a little and talk incoherently, and did not lose them again in the subsequent exacerbations through the day. This comparative abatement in the severity of the symptoms which takes place during the day, scarcely deserves the name of a remission, so frequently is it disturbed by slight increase in the febrile tendency. Amid these very perceptible exacerbations, there does not appear to be left in the system stamina adequate to overcome the depressed state of the vital powers. The surface continues low in temperature; the pulse small, equal, and quick, occasionally fluttering; the speech falters; the tongue is white and moist; and the thirst has abated. Towards night, however, the symptoms become much

more alarming, and are altogether indicative of an oppressed condition: the eyes again become muddy; the countenance is bloated and swollen; the anguish at the heart and epigastrium increases; and the restlessness is incessant: the pulse is small, quick, and unsteady; the thirst urgent; the tongue dry; the articulation very indistinct; delirium, or in the worst cases coma, comes on; and occasionally there is vomiting, or purging, or both, either of which add much to the general distress and hasten the termination of the disease. Towards morning a calm ensues, which is occasionally accompanied by perspiration. Those who are not accustomed to this form of the disease are very apt to argue favourably from this event. It is however entirely fallacious. The quiet condition in which the patient lies is rather attributable to exhaustion from the excessive restlessness and febrile state of the previous night, than to any real abatement of the disease. During the day many exacerbations of febrile action take place; but these are so slight and so little marked from the weak and sinking state in which the patient is, that, without the minutest observation, their presence might not be perceived. Towards night death often takes place, though occasionally the patient survives in a low typhoid delirious condition, in which there is much drowsiness and alarming prostration, the body being covered by petechiæ and vibices, while buboes and other characteristics common to putrid disease, but very rarely carbuncles, make their appearance. When buboes are present they are not usually observable before the second day, generally on the third, are attended by little pain, and never pass into suppuration. The course of this form of plague is not apparently influenced by the appearance, or by the progress, of the buboes. When carbuncles occur, which, as we observed, is very rarely the case, crusts form round the edges, of which a little matter is secreted, but never to such an extent as to facilitate the separation of the crusts; sometimes they remain dry and shrivelled. Very few indeed, it may be said none, of those who are attacked by this form of plague recover. They usually die, as is observed in the severer cases, on the first or third days, and but rarely survive the fifth.

Sequelæ and complications. The consequences of plague are not very numerous. The period to which the fatal termination is postponed, varies according to the nature of the disease and the constitution of the patient. Occasionally, when the specific influence which causes plague is in its greatest intensity, the system yields to it, and sinks without a struggle, a few hours only intervening after the first symptoms have appeared. These rapid and malignant cases are usually met with at the very commencement of the epidemic; afterwards cases are frequent in which the patient lingers till the seventeenth or twentieth day. Death ensues, sometimes as the result, as it were, of pure exhaustion; sometimes as the consequence of syncope; at other times it occurs from a convulsion, or a sort of apoplectic seizure. When recovery takes place, the convalescence which immediately follows on the cessation of the more severe symptoms, though not very protracted, is yet generally attended by a slight febricula; this in fact continues until the complete healing of the buboes has taken place, when there remain scars which are never obliterated.

A very curious consequence of recovery from plague, which has been much dwelt on by some writers, is a tendency to lewdness and incontinence. The degree of phrenzy and bestiality which has attended this disposition has, in some instances, been excessive: with the exception of these, authors have not particularly mentioned any very marked local or functional disorders as sequelæ of plague; nor do they mention that it is complicated with, or modified by, other diseases. We may therefore conclude, either that they do not take place, or, if they do, that the symptoms of plague are so prominent as to obscure them. Although these complications are not spoken of, yet many observers state the very remarkable fact, that open wounds apparently afford protection against an attack of plague. As early as the time of Galen the observation was made, that, while the disease was raging on all sides, those having running issues were not affected. The same fact has been observed by many modern writers; Desgennetes observes, that "wounded men en-

joyed an immunity so long as their wounds were in a state of excessive suppuration, but which they lost when their sores healed." Some of the older writers, with Sydenham and Heberden, mention plague as preceded by, and in the first instances complicated with, a very fatal form of spotted fever. There can be no doubt, from the light thrown on this subject by the more extensive observations of some modern writers, that these were really cases of plague, but not characterised by the formation of the bubo.

Anatomical characters. Until within the last few years the knowledge of the lesions which take place in plague was very limited; for not only was there an overwhelming feeling of the danger of such examinations, but the prejudices of the countries in which this disease most usually occurs were opposed, under any circumstances, to such investigations. In more recent times, however, these feelings and difficulties have been overcome; and the researches which have been made by Frank, Chicoyneau, Verny, Fonillier, Deidier, and more especially Bulard and Clot Bey, furnish us with very extensive details of the morbid states observable after death. Before describing these however, it must be borne in mind, that no very great extent of morbid lesion is to be seen in the most malignant forms, but rather in those where the disease has been protracted. It may in fact be stated, that the number and intensity of the organic changes observable, are in an inverse ratio to the intensity of the disease. With this explanation we shall now proceed to state the appearances which have been noticed on dissection.

Externally on the neck and upper part of the chest, on the limbs and about the external organs of generation, distinct petechiæ, large vibices, and extensive masses of discoloured integument, are in most instances observed. These appearances have generally been assumed as indicative of a very putrid state of the body; but there is really in the bodies of those dying of plague no particular tendency to rapid decomposition. Besides the eruptions now described, there are usually many carbuncles in different stages and forms scattered over the person, together with buboes in the groins and arm-pits, and occasionally, though very rarely, in the neck. According to Clot Bey, wherever buboes had not made their appearance, the lymphatic glands generally were enlarged. The subcutaneous veins are not distended to an extent to be externally apparent. The expression of the countenance is sunken and collapsed, having entirely lost the bloated and livid aspect which it presented shortly before death. The eyelids are closed, the mouth is open and covered, as well as the nose, with sordes, and the dark-coloured matter which has been vomited. There is a general impression, that the countenances of those dying of plague are peculiarly deformed; but this does not really appear to be the case; indeed, Clot Bey says decidedly, that "the corpses have not the hideous aspect which physicians have described and artists painted."

The muscles never acquire that perfect rigidity which is usually consequent on death. Their softness and want of cohesion in the fibre evidently show that a considerable deficiency of tone had taken place throughout the whole muscular tissue during the progress of the disease. In colour they appeared to be somewhat livid, presenting here and there characters of a more localised inflammation.

In the cavity of the cranium, with the exception of some little fulness of the vessels, no very particular morbid appearances have been observed. The brain itself in some few cases may be said to be generally softer than is usual, and there may be rather an injected appearance in its medullary portion, as well as a lighter colour than natural of its cineritious substance. The sinuses of the dura mater together with its vessels are certainly distended, but the dura mater itself and the other investing membranes of the brain show no signs whatever of inflammation, nor is there otherwise any trace of disease in them. The choroid plexus is not unduly injected, nor is there any morbid increase of fluid in the ventricles. Bulard says, that "the sympathetic nerve is neither red nor softened; its ganglia are always healthy; and it is only in

some rare cases that petechiæ, or rather an exudation of blood, have been seen on it in the lower part of the chest; when closely examined, these specks are found to be only of the thickness of the neurilema, and do not pervade the tissue of the nerve." The neurilema also undergoes a remarkable change in size, where the nerves are included in knotty swellings of the lymphatics. When these swellings are much developed, and when there is much blood in the part, then the outer surface of the neurilema is observed to be freely covered with these specks; but on a slight incision, and a careful dissection being made, it may easily be seen that they are confined to the external layer of the neurilema and to the cellular tissue surrounding it. The different plexuses of nerves, and particularly the solar, are without any appreciable alteration.

The diaphragm has in one or two instances been found inflamed, and to have petechiæ scattered over its surface. Generally speaking the state of the lungs presents nothing unusual; sometimes they are slightly engorged; and cases are mentioned, where an inflammatory appearance has been observed. Dr. Craigie however describes the lungs to be of a deep black or livid colour, with their vessels distended by a thick dark-coloured blood, and their substance softened, in some instances chequered by livid stripes or patches, generally swelled or enlarged, so as to protrude the heart and project occasionally from the chest. The changes in the circulating system are extensive and important. The pericardium rarely presents externally any particularly diseased appearance, with the exception of its being distended. Internally, both where it is free and where it covers the heart, petechiæ in distinct spots are occasionally met with; usually its cavity contains rather a larger quantity of fluid than is natural. This fluid is of a bloody colour—a fact which Baron Larrey, in his *Memoirs of Military Surgery*, particularly dwells on. The heart itself is almost invariably found flabby and enlarged; it is said to be generally one third larger, and Clot Bey even speaks of its being twice the natural size: its fibre is pale and softened. The system connected with the venous circulation appears to be especially disordered. The orifice of the right ventricle is usually dilated, as well as the ventricle itself, which contains a quantity of black fluid blood surrounding a mass of fibrin. The whole system appears overloaded and distended, at least this is evidently the condition of the venæ portæ and larger veins, which are in many places discoloured and obviously diseased. The blood which they contain is fibrinous, and of a dark colour, with oily looking particles, resembling greasy soup, floating on its surface. Occasionally it has been observed to be unduly liquid, inflammatory, and sizy. (*Relation Historique de la Peste de Marseille.*) The arteries are for the most part empty, and to all appearances healthy, excepting in some rare cases where a few livid spots are scattered over their external coat. These are not of so defined and decided a character as to warrant their being termed petechiæ, though doubtless they are of the same origin and character.

The digestive organs in many respects show evidence of very considerable disease. There is almost always general softening of the membranes, which compose the alimentary canal; the serous, muscular, or mucous membranes of which appear to be so degenerated in their structure, that they are torn with the slightest force. The stomach internally is covered over with slimy yellowish mucus (Savaresi, *Histoire Médicale de l'Armée d'Orient*), and contains a quantity of a dark-coloured fluid; at times this fluid is almost black, and, on analysis (*Wochenschrift für die gesammte Heilkunde*, No. xlii.), has yielded in 100 parts—

Water	95·75
Oxide of iron	·25
Resin	1·75
Mucus and fat	·25
Albumen with colouring matter	2·00

The authors of the *Relation, Historique de la Peste de Marseille*, state, that in

many of those who died during the pestilence which raged there in 1720, the bodies which they examined presented no particular appearances of disease, with the exception of some slight traces of inflammation perceptible in the mucous membrane of the intestines. Recent investigation has however shown, that, on washing away the slimy yellow mucus from the stomach, its mucous surface is covered in many places with very distinct petechiæ, varying according to Bulard, as in the skin, in colour, and size. They sometimes run together, so as to form a continuous bluish-red surface, of a very characteristic appearance, and which can in no way be confounded with the appearances of the inflammatory stage of acute gastro-enteritis. Occasionally, in some very protracted cases, ulcerations are observable among the rugæ, seldom however towards the cardiac orifice. These ulcerations generally appear across the lines of the rugæ; sometimes they are situated longitudinally in the folds. They never appear to be very deep, or to affect any other than the mucous membrane. The appearances that these ulcerations present are, small defined circles of a reddish liver colour, surrounding an abraded surface, in the centre of which is seen a small dark spot, evidently gangrenous.

The small intestines are generally distended. Externally, with the exception of the softening of their coats and a slight yellowish tinge, there are no evidences of alteration of structure. Internally, there is frequently a small quantity of a dark-coloured fluid, not dissimilar to that found in the stomach, the mucous surface being covered with numerous petechiæ, smaller and more distant than those in the stomach, and here and there are extended spots of one or two inches in length of a red colour, as well as streaks resembling ecchymosis. The iliocæcal valve and the appendix vermiformis are often discoloured and of a livid hue. The latter is sometimes very much enlarged, even in some cases to three times its usual size. The large intestines are rarely diseased. The liver is perfectly natural as far as regards shape and size; sometimes, however, a few petechiæ may be met with upon its external surface, and occasionally, but the cases are very rare, the border of the left lobe is occupied by carbuncular inflammation. On cutting into its substance, it is found gorged with blood, but not to any greater extent than might have been expected from the loaded state of the venæ portæ and the venous system generally. The gall bladder to all appearances is distended, and its sides are thickened, and have somewhat of a bluish tinge. The quantity of bile which it contains is nevertheless not very considerable; it is of the ordinary dark-greenish colour, and of the usual consistence, sometimes, according to Larrey, (*Memoirs of Military Surgery*) it is very fetid. Deidier (*Dissertation sur la Contagion de la Peste*) says, that "in many of those who died at Marseilles, during the time that the plague raged there in 1720, the gall bladder was found to be extremely loaded with black or greenish bile." Of all the viscera the spleen is the most frequently altered in structure; it is frequently considerably enlarged. Its external covering is usually softened and covered with petechiæ: internally its parenchyma is broken down, presenting the appearance of grumous blood.

The pancreas has been found in some few cases slightly hardened and enlarged, but this lesion is so rarely observed, that it can scarcely be said to be proper to plague. The kidneys are usually increased in bulk, varying from the least perceptible increase to three times their ordinary size. Their external surface is not unfrequently spotted with petechiæ, which from running together give the appearance of ecchymosis. The structure of the interior of the kidney is not materially altered, excepting that it is softer and more easily torn. It is overcharged both in its cortical and tubular structure with a black fluid blood. Clot Bey describes it as of a deep violet colour, gorged with blood, and to have a true hæmorrhage into the pelvis. The ureter also partakes somewhat of disease, for, generally speaking, extensive ecchymoses are found to have taken place beneath its external coat. The bladder is but very rarely affected, but is generally found to contain a quantity of urine, deeply tinged with blood. In very severe and protracted cases, however, its

mucous membrane may be covered with patches of mucus, and occasionally spotted with petechiæ.

When the glands (chiefly the inguinal and axillary) are diseased, they are enlarged, and covered with bruised-like integument. On cutting into them there is much sanguineous effusion in their immediate neighbourhood; and surrounding and connected with them are knotted masses of lymphatic tissue, as well as portions of cellular membrane, the inflammation and enlargement of which form small tumours. The diseased glands are found varying from their natural size to that of a large egg, ranging in colour from a grey to the deepest livid, and in point of hardness from that of a scirrhus to fluid softness. When cut into this is immediately explained, by their presenting every condition from the earliest stage of inflammation to that of suppuration. Clot Bey (*Brit. and For. Med. Rev.*, vol. i. p. 248.) says, that "the lymphatic glands are always gorged, sometimes increased five or six times, softened, and of a colour like lees of wine, and sometimes black; those of the groin or armpit, by their agglomeration, form a homogeneous mass, of a colour almost always like lees of wine, with effusion of black blood into the surrounding cellular tissue. A similar change may be seen in the chain of glands along the vessels of the abdomen and chest; and in many cases the extravasation of blood around them amounts to hæmorrhage.

Such may be considered as the more ordinary lesions which take place in plague. The last that have been now described, namely, those of the lymphatic system, Bulard views as primary, they being the essential lesions of the disease; while he regards the others as secondary, and the consequence of diseased actions originating in the primary lymphatic affection.

Diagnosis. A few words only need be said on the diagnosis of plague. This disease, for the most part, is not likely to be confounded with any other. Its symptoms are usually so well-marked, that in those cases which run a complete course, no hesitation need be felt in deciding on its identity. The intense fever, the staggering gait, and the eruption of the buboes, &c. sufficiently indicate its presence. Under two conditions, however, some little difficulty may occur. The first is to distinguish it from a low typhoid fever, when the eruptive symptoms have not shown themselves; and, in the other case, it may be mistaken for syphilis when inguinal bubo without concomitant fever appears.

In the former case the peculiar expression of the eyes, the enlarged tongue, and the difficult articulation, are indications sufficiently distinct of its being the true plague; while, in the latter, the lower situation in the thigh of the glandular swelling than is usual in syphilitic irritation, forms in some measure a characteristic difference. In this latter case, however, the diagnosis must be chiefly formed, not on the intrinsic merit of any particular symptom or appearance, but on the epidemic concurrence of the plague at the time in other persons.

Prognosis. From the history which has now been given, the value of many of the phenomena of the disease, as indicative of the subsequent course which any individual case may take, can in some measure be appreciated. It will not, however, be unprofitable to bring together those characters of the disease from which a prognosis is chiefly formed. Generally speaking it may be said, that those cases are peculiarly favourable in which buboes arise early, and go on rapidly through their several stages to a kindly suppuration, especially if there be an absence of any very marked fever, or if there be no or very little vomiting, or if the respiration do not correspond with the smallness of the pulse. The condition of a bubo is favourable when, at its commencement, it is firm and unyielding to the touch, is not generally adherent, and easily movable at its base. In case of fever being a concomitant, it is always favourable if there be a copious eruption of buboes only, or of carbuncles in great numbers and with broad surfaces, and if the fever itself be open, nor, during its course, attended by much cerebral disturbance, but more especially if it subside after a gentle perspiration, or even the critical sweat of the third and fifth days. The case is always to be judged of favourably, if the patient survive to the

eighth day, as this argues a state of constitution which is superior to the influence of the disease: moreover, during so protracted a period there are ever symptoms of reaction which give great chance of hope that a crisis may occur. This period, however, generally takes place about the commencement of the second stage, and is marked by the very perceptible lessening of the restless and excitable state of the patient, by the buboes enlarging, becoming softer, and passing into suppuration; by the sudden appearance of several carbuncles with broad bases, sometimes so large as to be five inches in extent: this condition is sometimes accompanied with a papular and vesicular eruption of boils and large red blotches, or a tendency to hæmorrhage from the nose, and in females from the vagina. The pulse is almost natural, not exceeding seventy-five, soft, and open; the skin, which previously was harsh and dry, becomes soft and bedewed with moisture; the tongue loses its sooty coat, which cracks, becomes moist, and peals off; the expression of the eye becomes natural, the pupil being no longer dilated nor the conjunctiva injected: indeed, the whole condition of the patient shows an amelioration in the symptoms which, going on favourably, ends in recovery.

The circumstances which indicate a fatal termination are, at the commencement, a suddenly depressed state of the system unfollowed by any reactive power, but more especially when accompanied by no eruption of buboes: if however any of the febrile eruptions do take place, and there is also delirium together with excessive cardialgic pains, the prognosis is bad; but should these symptoms not manifest themselves until the second day, they are not to be judged of so unfavourably: if the disease go on in its course without any excessive fever or cerebral derangement, and without evincing any tendency to glandular enlargement, but in place of them petechiæ or carbuncles make their appearance, an unfavourable termination may be anticipated—the occurrence of petechiæ and carbuncles, as evidence of a gangrenous character, is to be regarded as unfavourable, especially if these eruptions occur in great abundance. The other circumstances which most manifestly denote an untoward termination are, a general aspect of malignity, as evidenced in a low putrid condition of the system, the non-appearance of matutinal moisture, urgent pains about the heart, a drunken expression of the countenance, the muddy eye, colliquative diarrhœa, severe vomiting, hæmorrhages from the mucous surfaces that are constant and not critical, hiccough, coma, low muttering delirium, and the sudden clearing up of the mental faculties after a period of violent excitement.

Statistics. The statistics of plague show that it has been at all times attended by the greatest mortality. When this disease raged throughout Europe, between the years 1347 and 1350, it has been computed that a fourth part of the inhabitants of this quarter of the globe were carried off. During the prevalence of this pestilence, which has been emphatically called the Black Death of the fourteenth century, Hecker says that, without exaggeration, Europe lost 25,000,000 of inhabitants. During the time that the plague raged at Marseilles in 1720, it is recorded that in the Hôpital de la Charité there were admitted, from the 3rd of October to the end of February, 1013; and that of these 585 died; and during the same period, in the Hôpital du Jeu de Mail, from October to the 3rd of July, 1512 were admitted, of whom 820 died. These numbers, however, give a higher rate of mortality than the returns of the disease rendered in the town generally: this might naturally be expected, as only the severer cases would be removed to the hospitals. The population of Marseilles, previous to the occurrence of the disease, was calculated to be about 90,000, of these 40,000 died, 10,000 only of the whole population not having been in any way affected; so that it gives the enormous mortality of 50 per cent. of those who were attacked by plague. M. Gerardin (*Mém. de l'Acad. Roy. de Méd.*, tom. vi.) gives a very extended notice of the plague as it raged in Moscow in the year 1771; in the course of this he quotes from Orræus a table of the deaths during the plague year, 1771. In April there were 744; in May, 851; in June, 1099; in July, 1708; in August, 7268; in September,

21,401 ; in October, 17,561 ; in November, 5235 ; in December, 805 : making a total in nine months of 56,772. It is probable, however, that the mortality was even greater than is here stated, as many dead bodies were afterwards found in houses and concealed places, of which no report was given, and consequently were not included in the report. (*Edin. Med. and Surg. Journ.*, vol. xlix. p. 242.) In the returns made to the senate and council of health, the number of deaths by plague exceeded 70,000 according to De Mertens, and if to these be added the number of those privately and secretly buried, he thinks it cannot be under 80,000. But the fatal effects of this epidemic may be better appreciated from the following facts:—Between December 1770 and March 1771, when the great influx of strangers and inhabitants takes place, it was calculated that the population amounted to 250,000, and according to some 300,000. As they begin in March to return to the country, it is supposed that at least one fourth of the inhabitants must be absent during the summer season. During the summer of 1771, the apprehension of the plague had driven so many from the city, that it is believed by De Mertens that, in the month of August, not more than 150,000 remained at Moscow. Allowing therefore, that of this number 80,000 were cut off by the disease, it appears that the mortality was at least $53\frac{1}{3}$ per cent., or considerably more than one half of the whole population. M. Gerardin estimates the number destroyed by the epidemic to have been 60,000 only; but according to various documents and considerations, it is placed so high as 80,000 by De Mertens, who, being upon the spot, had good means of information. It is remarkable that neither De Mertens, Orræus, Samoilowitz, nor M. Gerardin, in their eagerness to furnish the amount of mortality, give us any information on the number of recoveries; being thus left completely in the dark as to the relation of the mortality to the numbers attacked by the disease, we are left to infer, that few or none survived the attack of the epidemic. Jackson in his description of the plague (*Account of the Empire of Morocco*), in the empire of Morocco, during the year 1779, mentions the instance of the small village of Diabet, in which 100 persons fell victims to the plague out of 133, the original population of the village before the visitation of the plague. He further says, that " many similar circumstances might be adduced relative to the numerous and populous villages dispersed through the extensive shelluh province of Haha, all which shared a stances might be here adduced relative to the numerous and populous villages dispersed through the extensive shelluh province of Haha, all which shared a similar or worse fate." Travelling through this province shortly after the plague had exhausted itself, he saw many uninhabited ruins, which he before had witnessed to be flourishing villages. On making inquiry concerning the population of these dismal remains, he was informed, that, in one village which had contained 600 inhabitants, four persons only had escaped the ravage. Other villages which had contained 400 or 500, had only seven or eight survivors left to relate the calamities they had suffered. The destruction in the province of Suse was considerably greater than elsewhere; Terodant lost, when the infection was at its height, about 800 each day; the ruined but still extensive city of Morocco lost 1000 each day; the populous cities of Old and New Fez, 1200 or 1500; insomuch that, in these extensive cities, the mortality was so great, that the living had not time to bury the dead.

We shall conclude this division of our subject by quoting the following table of mortality from the effects of plague on the population of Smyrna for five months in 1834:—

Absolute Number.					Comparative Number.		
In Proportion.		Cases.	Died.	Cured	Cases. Prop.	Mort. Cases.	Mort. Pop.
Turks - -	58,000	4500	4000	500	1 : 13	8 : 9	1 : 141
Greeks - -	48,000	600	450	150	1 : 80	3 : 4	1 : 106^{5}
Catholics - -	10,000	50	30	20	1 : 200	3 : 5	1 : 333
Jews - -	8,000	457	297	160	1 : 18	2 : 3	1 : 27
Armenians -	6,000	120	54	77	1 : 50	3 : 7	1 : 111
Total -	130,000	5727	4831	907	1 : $22\frac{3}{5}$	4 : 5	1 : $26\frac{1}{4}$

The singular excess of mortality which the above table shows to have taken place amongst the Turks, is attributed by Bulard to their non-attendance to the prophylactic measures, which are resorted to by the other sects living in the East.

Mortality however, in plague, is influenced very considerably by many circumstances, as age, profession, climate, &c.

Infants, when born of parents suffering under the influence of plague, have occasionally on their persons some marks of the disease. These are never known to survive, nor indeed do they when born under such circumstances, though they have apparently none of the usual plague eruptions about them. It has been commonly observed, that the young, healthy, and robust, are the most susceptible of plague influence, then women and children, and, least of all, thin, sickly, emaciated old men. We have already alluded to the tendency which women have to excessive and unusual uterine discharge, and in case of pregnancy to premature labour. This, provided the symptoms assume a putrid character, add very considerably to the danger of their situation; otherwise the flux of blood is often attended by beneficial results. Dr. Brown does not, however, view this as a critical discharge, but as an evidence of returning health, Notwithstanding this chance against the adult female, observation has shown that in them, as is the case in children and sickly old men, the liability to perish under the poisonous influence of the disease is not so great as in robust adult men. Bulard however says, that " sex produces no marked difference."

Occupation, as may naturally be supposed, influences somewhat the liability to the disease. Generally those whose labour exposes them to midday heats, under circumstances of privation, are particularly susceptible. Russell says. that bakers are very liable to it, and that they have been observed to suffer in a remarkable proportion; and suggests, that as the loss of these people during a pestilence is most serious, their safety should be particularly looked to. In the historical account of plague as it occurred at Marseilles, we find the following summary of mortality in different trades:—" Of 100 manufacturing hatters, there died 53; of 134 house-carpenters, 84; of 138 tailors, 78; of 200 shoemakers, 110; of 400 cobblers, 50; and of 500 masons, 350; of persons in a still lower station of life, such as porters and chairmen, the mortality was very great indeed; scarcely a sixth part remaining at the close of the epidemic.

Situation, climate, and season of the year, there can be no doubt, are very essential elements in the production of the peculiar virus which originates plague. Though it may be impossible for us to explain how this may be, yet the recorded facts of many centuries offer evidence short only of the most positive proof. In respect to situation and climate, it has long been observed, that certain localities in the East, as Constantinople, Smyrna, Cairo, and the towns towards the Mouths of the Nile, are most frequently prone to be ravaged by it; and that it occurs in these places, not only with epidemical severity in certain seasons, which experience has shown are the more congenial to the spread of its morbific powers, but that they are rarely found to be without some few cases which sporadically occur. In fact, Abbot, Pruner, and Gregson (Holroyd's *Letter on the Quarantine Laws*), state that they believe Egypt never to be free from it; nor that it ever will be entirely so, as long as the conditions, which now predominate in the climatical exposition and in its interior disposition, continue. Though there may, from certain circumstances, be every reason to suppose that these situations and the climates proper to them possess the generating powers requisite to originate the disease, yet, at the same time, other circumstances occasionally occur, which militate against its either being exclusively owing to one or to the other, as is clearly evidenced by the occasional occurrence of plague in other and more distant places, and which appear in no respect to have any thing in common with the eastern districts. A very extended observation would appear, however, to warrant the conclusion, that plague can arise in no other portion of the globe than that which is included between the tropic of cancer and the sixtieth degree of north

latitude. Season of the year has in like manner a general influence both upon the origin and progress of this disease; but there are also exceptions to its exerting any exclusive power. The common impression in the East is, that plague is arrested in its course by excessive degrees, either of heat or cold, and that an intermediate temperature favours its spread. Sir Gilbert Blane (*Select Dissertations*) says, "the experience of ages has incontestably established it, that the disease of the plague cannot coexist with a heat of atmosphere above 80°, nor a little below 60°." This idea has been formed, and very justly so, on the fact, that in the East the plague, which usually commences in the spring of the year, subsides on the advent of summer; while in Europe it usually occurs at the commencement of, and continues through, the summer, but subsides as winter advances: thus towards the end of September, but still more sensibly in the second week of October, the plague when occurring in London has usually been observed to decline; and its decrease in November has been always rapid. This has been the ordinary tenor of its course, from which it has rarely deviated more than a few days. (Russell, *op. cit.*) Though this is what ordinarily takes place, yet now and then circumstances occur, which at once destroy any positive conclusions upon the subject: for instance, in 1813 it raged in Malta during the summer, and in Corfu during the winter; similar anomalies were observed in England during its prevalence in the early part of the seventeenth century.

The decrease of plague in the East towards the middle of June is so remarkable, that, at Cairo, St. John's Day, which is the 24th of June, is ever understood amongst the superstitious inhabitants of these districts to put a period to the disease. The uniformity of its decrease as the summer advances is so very marked, that those persons who have previously confined themselves invariably on this day come forth, mix with other people, transact their ordinary affairs, and in no respect restrain themselves on account of any fear of taking the disease. It is generally supposed throughout Egypt that the heavy nycta, or mildews, which begin to fall about this period of the year, form the condition upon which depends the arresting the progress of the disease. There has been, however, no corroborative fact noticed, which enables us to infer that any condition of dryness, or of moisture, possesses this peculiar influence upon the disease. Gregory says, that "it is a common remark in the Levant, that the advances of the plague are always from south to north; and that, when plague is at Smyrna, the inhabitants of Aleppo handle goods without precaution, and have no fears of contagion; when the disease, on the other hand, is at Damascus, great precautions are observed, and all the Frank families hold themselves in readiness to *shut up*, or to leave the town."

Plague usually lasts as an epidemic for the space of three or four months. In the East, from whence the history is best filled up, it usually commences about March, by a few solitary cases of the utmost severity; the great mortality then commences, and is maintained with fluctuating variations until the period of its decline. This is sometimes remarkably sudden. Such a progress marked its occurrence at Marseilles in 1720. It is described as having advanced rapidly in August, raged through that month and September, and that its decline in October was almost as sudden as its commencement had been in August. This mode of its ceasing appears to obtain in all places, whatever may have been its duration, or whatever may have been the means employed against it, whether precautionary or curative. During the progress of the epidemic, there are evidently three periods in the course of which the mortality very considerably varies. At its commencement the disease is not very widely disseminated, but its relative mortality is greatest; as it arrives at its height the population is more universally infected, but the relative number of deaths is very materially diminished; and at its decline both the number of cases and the relative mortality are decreased to a sudden and remarkable extent.

It has generally been supposed, that animals are earlier susceptible of the influences which produce plague than man. This belief is grounded on the

fact, that, previous to this disease becoming epidemic, epizootic affections have been observed almost universally to attack cattle, under the effects of which great numbers of them perish; that birds desert the spot; that insects become more numerous; and that frogs are more vociferous. On some of these points there is the most decided and incontestable evidences. Hodges mentions the mortality of cattle in London, previous to the plague of 1565, as being very considerable. The medical faculty of Paris, during the prevalence of the black death in the fourteenth century, were commissioned to deliver their opinion on its causes. In this document they mention great mortality amongst fish; but the most distinct and valuable testimony upon this point is that of Dr. Gregson's (Holroyd's *Letter*): he says, before the disease broke out (1835), a number of the Pacha's oxen were seized with a malady of which above 100 died in a few days, and that he was sent to investigate and report on this epidemic. On examination he found gastritis and enteritis in the most intense degree, to such an extent indeed, that he met with extensive gangrene in oxen, which had been observed ill but twelve hours. They also had large buboes. This he reported to be plague, and caused them to be interred deeply. Of animals dying during the prevalence of plague, there are numerous instances on record. Boccacio, who has given by no means the least instructive history of the epidemic of the fourteenth century, alludes to the mortality amongst animals, and details his having seen two hogs affected by it, which, after staggering about for a short time, fell down dead, as if they had taken poison. Hecker observes, that "in other places multitudes of dogs, cats, fowls, and other animals, fell victims to the contagion." Bulard inserted the serum from the carbuncles, and the pus from the buboes, and the blood from the heart and veins, &c. of those infected, into the subcutaneous cellular tissue of dogs and other animals; he also caused them to eat the same pathological products; but never succeeded in thus communicating the disease.

Nature of Plague. The phenomena attending the development of plague during life, and the lesions observed after death, do not enable us satisfactorily to decide upon its proximate cause or nature. Those writers who have entertained theories upon fevers generally, apply them most complacently to plague; and without much effort, but some little ambiguity, reconcile all that takes place to their favourite views. We shall not, however, dwell upon the "considerable spasm and loss of tone in the extreme vessels" of Cullen; nor upon the gastro-enteritis of Broussais, the frequent absence of which even to the period of death he explains, by saying, it has not had time to develop itself; nor to the equally puerile views of another pathologist, who states plague to be an inflammation of the bronchial tubes—comparatively speaking, a very rare seat of lesion in this disease; nor upon several others which might be named, but content ourselves by giving a short abstract of the opinions entertained by Craigie and Bulard. The former of these writers applies the general view which he advocates, namely, that it is owing to derangement of the capillary system. In reference to the disease now under consideration, he says, that "the remote material agent which causes it, whatever that may be, acts upon the capillary vessels immediately or secondarily through their contents, in every tissue and every organ of the human body. The result of which is, that the fluids are no longer freely transmitted through them, so that there is produced a sudden and almost immediate retardation of the motion of the blood through the capillaries of the whole system." He infers this to be the case from the four following circumstances: — "1st. That the arteries of the brain and its investments of the stomach, of the intestinal tube, and of the secreting glands, are distended with dark-coloured semifluid blood; 2dly, Because the vessels, of all the organs are much loaded with dark-coloured fluid blood, which escapes immediately on the smallest incisions; 3dly, Because in several of the organs, for instance the brain, the lungs, the liver, the kidneys, and other solid organs, nay even in the muscles, dark-coloured half-coagulated blood is found fixed in

clusters of vessels, so as to form dark or carbonaceous patches and masses; and, 4thly, Because dark grumous blood is found, not only in the right chambers of the heart, but in the left auricle and ventricle, in which they are not usually found in ordinary death." (*Practice of Physic.*)

Bulard is not less ingenious. He states plague to be the contagious product of lymphatic absorption. This view is grounded upon the statement, that the only symptom which has been remarked as alone and distinct from any other at the commencement of the disease, is pain in the lymphatic glands. This is at first but a slight throbbing, becoming more violent and continued, and ultimately succeeded by swelling and buboes. This change in the lymphatic glands is the only lesion which is to be found totally isolated from all others, and it is consequent upon changes in the lymph; and therefore each, during the local affection, is to be considered only as consecutive to this disorder in the lymphatic system; in which consists the simple original affection, the essence of the disease, and without which no general disturbance could have occurred. This view Bulard supports on the grounds, that the whole system of lymphatic vessels, whether going from or to the gland, is not diseased, but only the glands themselves; therefore he argues, that, as these are always diseased and the vessels never, it is evident that the malady is not conveyed by continuity of tissue, but that the diseased principle is introduced into the lymphatic circulation; and therefore the alteration of the lymph is cause and reason sufficient for the phenomena of diseased absorption, the pathological effects of which are displayed on the glands. The disease, therefore, arises from a change in the lymph. This constitutes the primary affection, the secondary effect of which is, that as this degeneration in the lymphatic fluids becomes more or less advanced, the blood itself becomes decomposed by the morbid lymph entering into its composition by the venous circulation. It thus loses its normal qualities, and then causes a general disturbance, a deep disorganisation in all its functions; in short, all the derangements of a true poisoning. From this moment it loses its physiological character, and assumes one entirely peculiar to itself: and hence are to be explained the lesions met with throughout the system—the livid colour of the stomach, the swollen state of its mucous membrane, the softened state of the spleen, gorged as it is with a black grumous blood, the enlarged and softened condition of the heart, &c.; in fact, every lesion which has been mentioned. Hecker in his account of the black death reverses the theory of Bulard, stating that the blood is first attacked through the atmospheric poison acting on the organs of respiration; and that the inflammation in the lymphatic glands and other organs is only consequent upon the change thus affected in the vital fluid.

Causes. Numerous conflicting opinions have been entertained as to the origin and spread of plague. We shall endeavour to condense this often discussed inquiry. The first point that naturally presents itself is to determine, if possible, the original source of the disease. It has already been stated, that plague is of very constant occurrence in some parts of Egypt and Greece, in Syria and Asia Minor; in which countries it not only exists in particular times epidemically, but isolated, or, as they are technically termed, sporadic cases are always to be met with. Wherefore we may infer, that the causes which primarily produce plague, are indigenous, and always more or less in active operation. What its source may be is however very difficult to determine: some imagine that it arises from miasms which are consequent upon the retiring of the Nile after its periodical overflowings, when it leaves behind it a slimy deposit. Many arguments may, however, be urged against this. The numerous villages situated in the morass are neither the first nor the most constantly affected; on the contrary, observation proves that it first originates in towns situated on the sea-coast, and that in these places the mortality is ever the largest. Nor is it probable, that it has its origin from the soil, not only because no peculiarities have been pointed out in this respect, but that it arises in soils of a totally different nature. We are therefore reduced to the

belief, that plague is owing to certain occasional physical conditions, proper to the climate, and which may be termed its pestilential constitution. At the same time there can be no doubt, that the habits of the people who inhabit this district, and the filth of their towns, engender a susceptibility of the influences which produce the disease. Some, and among these are Desgennettes, Savaresi, Assalini, Larrey, &c. even go so far as to believe that in these circumstances alone there is sufficient cause for its origin. Dr. Hancock (*Cyc. Prac. Med.*) who entertains likewise this view of the connection of pestilence with filth, attributes its non-occurrence in recent years in some cities, where formerly it occasionally committed its devastations, to a state of cleanliness and ventilation having superseded their previous state of filth and pent-up vapours.

From what has been said there is every reason to infer, that plague originally depends upon the action of some local influence, probably atmospheric, the nature of which, with all our increased resources of extended knowledge, we are as totally incapable of understanding as our ancestors in the fourteenth century. We, however, observe that, in certain places, the disease so originated becomes diffused, and acquires what is termed an epidemic existence. It is highly important to inquire, whether this effect takes place solely through the immediate and still operating influence which originally engendered it, or whether the disease is contagious, or propagated by the miasm exhaled from the bodies of persons affected with plague.

Let us shortly examine the grounds upon which the doctrines of contagion are advocated. First, as regards inoculation. Various cases are recorded of individuals in good health inoculating themselves with matter taken from buboes and carbuncles of plague patients. Very different results have followed this operation. In some instances the symptoms of plague have appeared, while in others the only effect was slight local irritation, as might be anticipated from inserting a poisonous fluid matter into the cellular membrane. But even had plague occurred in all these cases, no satisfactory conclusion could be deduced from the fact of their having been performed in situations where the disease was prevalent at the time. In order fairly to test the question, it would be necessary to institute a most unjustifiable series of experiments, namely, the inoculating with plague products persons living at a distance from the localities where this disease occurs, and who could have no communication either direct or intermediate with plague cases, except through the matter with which the experiment is made.

Secondly, The other modes by which plague, according to the contagionists, may be propagated, are by immediate contact with the person diseased; by exhalations from the persons of the sick; by fomites, or the imbibition of the pestilential vapour; by certain substances which are supposed to be capable of retaining it in such a state of activity, as to have the power of regenerating the disease. This mode of propagation is esteemed to be more potent than either contact or miasmatic atmosphere. With regard to its propagation by immediate contact, Russell holds it to be an undeniable fact, that the plague is thus communicable, but that it is not ascertained at what particular stage of the disorder it is the most infectious. Some have laid it down as an established law, that the poison of the plague is so fixed, that, in order to be infected, contact is absolutely necessary, and that the disease may be communicated no other way, unless by inhaling the pestiferous breath of the patient.

The chief facts on which it is presumed that the plague is communicated by exhalation from the bodies of the diseased, are the modes in which it has commenced and spread in places where it has raged. Of these facts the following is a summary:—It is stated that the plague has been introduced into a district previously healthy, immediately after the arrival of an infected person; or that the first individual attacked has had intercourse with some persons affected with the disease or recently recovered from it; or has been exposed to the influence of imported fomites, conveyed in various species of merchandise, especially bales of cotton, flax, &c.; and that where a perfect exclusion of all

communication with the diseased districts can be effected by means of a strong cordon, complete security is obtained, although the disorder is raging violently without that circle.

The objections made to these views by those who maintain that the disease is solely caused by endemic influences are:—1. That a miasm emanating directly from a plague patient, or the transmission of the disease intermediately by fomites, are facts by no means conclusively proved; that in truth, the whole statements in favour of contagion are imperfect and unsatisfactory. 2. That certain places, when the immediate neighbourhood was under the influence of plague, have not been kept healthy by means of quarantine regulations. It has often been shown, that in such situations some few cases have occurred, but that the disease has not spread; which immunity has been attributed to the ventilation and internal discipline rendering those within the cordon less susceptible of the epidemic influence. 3. That many of those who are in the most constant communication with the sick do not take the disease; that the attendants, who perform all the necessary offices, as well as the medical men, escape; and that many who have advocated the doctrines of anti-contagion have ventured with impunity upon the more rash and hazardous experiments of tasting the secretions, wearing the clothes, and sleeping in the beds of those affected. That those engaged in burying the dead are not more subject to plague than other persons; and that sexual intercourse has even been known to have taken place without communicating the disease. 4. That the evidence of plague being communicated by inoculation is any thing but satisfactory. It has already been remarked, that to make the experiment conclusive, the person to be inoculated with plague matter should be living in some district far from the local or general influences of the disease. On the contrary, those cases previously referred to, where this method produced no results, go far to negative the communicability of the disease through the medium of pus, or other plague products introduced into the system by inoculation. 5. That the occurrence of sporadic cases is conclusive against the notion, that contagion is the sole origin of plague; and that the existence of those cases, without spreading the disease, is a fact which militates greatly against its being contagious at all. It is evident that the occurrence of isolated cases in large cities, which is not unfrequent, is a fact totally irreconcilable with the doctrines of contagion as sanctioned by its advocates. 6. That when the disease becomes prevalent in a district, it is found to occur in situations and among individuals where there is the least possible communication with the infected, and that it frequently breaks out in remote and separate parts of a town, without any traceable intercourse or communication. 7. That in maritime towns, where it is said to have been imported, it frequently happens that those who are the first affected live in parts which are distant from the shore, and therefore not in the nearest and most likely places to receive the infection. 8. That it is found to arrive in many localities at the same time, and this applies both to the country and to towns. In the East it is frequently observed to arise within a few days in places which are not only very distant, but under circumstances which prevented communication; and to occur in like manner simultaneously in different parts of the same town—facts which evidently show a more diffused influence than is probable on the supposition of human contagion. 9. That notwithstanding all the very curious and ingenious modes in which the propagation of plague has been said to have taken place, the possibility of which it requires a very large share of oriental credulity to believe, the disease is really very difficult to propagate by any means which as yet have been devised by man. Many instances, of adventurous experiment, made without success, sufciently prove this. 10. That numerous instances may be quoted, of large masses of persons moving from an infected district without carrying the disease with them. The contagionists state, that immense multitudes of hadjis or pilgrims, who go every year from Turkey to Arabia, through both Syria and Egypt, are

the instruments by which the plague is spread in the countries thus visited by them. So far, however, is this from being the case, that the marches of these people in different years take place at different seasons, while plague is a disease more especially of one season; and that, excepting when these marches of the Mussulmen coincide with the plague season, their progress is not characterised by its occurrence; and moreover, that many of the districts through which they pass during their pilgrimage are never known to suffer. That in 1824, when the plague raged so fiercely in European Turkey, many thousand Turkish pilgrims passed through Alexandria on their way to the Holy City; but in Alexandria there was only one case of plague, though no precautions were taken, and no quarantine regulations then existed to interrupt their progress. 11. That plague is a disease of endemic origin, and therefore that all those cases which are said to have been caused by contagion, are really owing to endemic influences. 12. That the spontaneous and sudden decline of plague at a particular season disproves the operation of a contagious principle, this being evidence that plague is influenced by climatorial changes—a condition which the advocates of contagion do not suppose consonant with its laws. That, on the other hand, it proves plague to be owing to some endemic influence which has now ceased to exist. That, on this periodic cessation taking place in the countries which are the most frequent seats of the disease, the inhabitants lose all dread, and from experience know, that without any evil consequences they may meet each other, visit the sick, wear the clothes of those who have died. 13. That, besides the above more general arguments against contagion, an inference to the same effect may be drawn from the fact, that before plague sets in, especially in such countries where it is of more rare occurrence, diseases of a putrid character and fatal tendency are prevalent; and that epizootic affections take place, which frequently cause great mortality amongst animals.

We believe that we have briefly, though fairly, stated the views of those who advocate plague to be a contagious disease, as likewise the chief objections offered to these views by the anti-contagionists. It has been seen that the statements of each party are sufficiently contrary; it may therefore be supposed to be somewhat difficult to arrive at any decided opinion upon the question. We are, however, inclined to believe that plague is essentially an endemic disease; that the causes, though unappreciable by us, become at times, from circumstances connected with season, which we likewise do not comprehend, so active and potent in their influence as to produce what is termed an epidemic; and that, when not occurring epidemically in those countries where such an effect often takes place, the causes are either dormant, or only in a state of very partial or slight activity. That, during the continuance of the epidemic effect, a principle is given off from the body, which, if very concentrated, and pent up in confined and unwholesome situations, may generate the disease, so that, though not originally contagious, it may in this way, by accumulation of animal miasms, be contagious; and that it is not improbable, when the disease is communicated from person to person, it is by the inhaling the pestiferous breath or exhalations which emanate from the body of the patient; but at the same time that this influence of the atmosphere of contagion is very limited in its power and extent. That a person who is himself uninfected cannot produce the disease in others by being, as it were, the bearer of it. That the communication of plague by inoculation with the matter from a bubo, or with any other morbid product, has by no means been proved; on the contrary, there is every reason to believe that the disease cannot be produced by these means. That fomites in themselves have no power of transmitting the disease. That those who have long dwelt in a place where plague has existed for some time, become as it were fortified against its influences, and are therefore less disposed to be affected than those who come fresh into the pestilential atmosphere.

The *predisposing* causes of plague are soon summed up. Independently of

the greater susceptibility of the prime of life and robust health, they are chiefly such as are the ordinary predisponents of fever, as terror, anxiety, dissipation, and exhausting exertions, want of rest, indulgence in the passions, whether of anger or of fear, &c.; but, more particularly, dwelling amidst filth in confined and ill-ventilated rooms or situations which are subject to noxious vapours.

Prophylactic measures. Various means have been suggested in order to prevent the occurrence of plague. The chief of these are, cleanliness, free ventilation, sobriety in all things, a sufficiency of good and wholesome food, the avoiding crowded rooms, and the frequent ablution of the body with cold water. This last deserves much attention, as it has been observed, that the water-carriers of Cairo enjoy a most singular immunity from the disease. It is also not improbable, that the lighting fires in houses, and thus effecting a perfect ventilation, would be attended by the most beneficial results, together with a judicious use of the chlorine gas, vinegar, and aromatics. There can also be no doubt, that it is the duty of all those whose sphere of life does not permit their rendering essential service to the afflicted, should, if it be in their power, remove from the seat of the disease, as by this means the number of victims is lessened, the district is less crowded, and more food and accommodation is left for those remaining.

Galen and many others have noticed, that those who had issues fully discharging did not fall victims to the disease; and Larrey, when with the French army in Egypt, mentions the curious fact before alluded to, that the plague rarely attacks wounded men whose wounds are in a state of plentiful suppuration; but that as soon as the wounds are skinned over, the immunity is no longer enjoyed. On these grounds it has been suggested, that issues might be employed as a preventative against the disease; and certainly there is every reason to anticipate success from it. It has likewise been observed, that those persons whose trades oblige them to be covered with oil, or any other greasy matters, are less susceptible. This has induced many to adopt frictions of this kind, and with a seemingly beneficial result; it may be therefore recommended to be used for such a purpose, especially as no injurious consequences have ever been noticed to follow its adoption. Inoculation, though sanguine expectations have been entertained upon it, has totally failed as a preventative against plague. In fact, the disease has never yet been satisfactorily shown to be produced by this means.

It may evidently be understood from the summary of opinions which have been given on the origin and progress of the disease, that we cannot be advocates for the system of quarantine. The laws and provisions made in order to enforce it, must not, however, be passed over in silence.

We believe that were they perfect and practically well carried out, which they certainly are not, they would yet be comparatively speaking useless. But they are, as now worked, not only useless, but most severe and vexatious incumbrances upon the liberty of the person; while the lazarettos, from the situations in which they are placed, from the nature of the buildings themselves, from the ignorance of the medical men which are appointed to them, tend unnecessarily to harass and annoy the individuals condemned to confinement in them, as also to constitute them places where disease may be rather originated than prevented. To speak of the mal-administration of the quarantine laws belongs, however, rather to the jurist than to the physician; we therefore content ourselves by referring here to the full and complete exposures of the cruelties, hardships, absurdities, and even iniquities of the whole system, in the short but pregnant pamphlets on Quarantine by Bowring and Holroyd.

Treatment. The treatment of plague arranges itself under the heads of general and local:—The general treatment to be followed is, in great measure, that which is ordinarily resorted to in typhus fever. On the first attack the primæ viæ should be cleared. Most practitioners recommend the immediate exhibition of

a smart purgative combined with mercury. With regard to the exhibition of calomel, Bulard says, that "his experience leads him to believe that it is always thrown up by vomiting, or evacuated by the watery motions which it causes." He also states, that "supported by the observations of M. Velpeau, on the application of mercury in acute peritonitis, and by the known action of this remedy on the lymphatic glands, he tried mercurial frictions and blue pill; the effects were such, that it remained doubtful whether the patients so treated suffered from the disease produced by the medicine, or from some new phase of the disease itself, which might have occurred without the exhibition of mercury." With regard to the use of mercurials, Bulard asserts his conviction, that it is a remedy in which much faith is not to be placed. Sir James M'Gregor states, however, he not only used it as a purgative, but urged its exhibition until some soreness of the mouth was produced; the consequence of which he reports to have been, that the skin became softer, the pulse more regular, the eye more clear, the tongue more moist, and that the thirst with the affection of the head and of the abdomen entirely disappeared. The evacuations were also copious, and approached more nearly to their natural colour.

The exhibition of the cathartic at the onset of the disease should be followed up by saline diaphoretics, and the free use of cooling diluents in order to promote a free perspiration. The best medicines of this class are the spirits of mindereris, the nitric æther, and camphor mixture. This line of treatment is much aided by cold ablution. Faulkner reports its use to have been followed by very immediate and good effects. The patient being soon relieved in all his feelings; and, when aided by sudorifics and diluents, that the perspiration, which comes on, is succeeded by a remission from all the symptoms. He details a case reported to him by a Maltese practitioner, which is very illustrative of the good effects derivable from the sudden application of cold water. A man in the height of delirium, and labouring under a most unpromising form of the disease, ran violently out of his chamber and precipitated himself into the sea. From this he seemed to experience sudden relief. He repeated this a second time, which evidently restored him to a state of convalescence, from which he perfectly regained his usual good health. Sponging with vinegar has likewise been much recommended, and there can be no doubt, from its being a grateful operation to the patient, that it is a salutary adjunct to the general treatment. Bloodletting has had its advocates in plague; but the general feeling, unless it is very early carried into effect, is decidedly opposed to its employment. A small quantity of blood taken from the arm at the very onset of the disease may occasionally be useful; but its general employment can by no means be advised, when we find Dr. Whyte stating, that he used the lancet freely, but that in every case in which he did so death followed.

Opium, if used with great circumspection, has been found a valuable remedy, by producing composure and a gentle perspiration; but it is a medicine which must not be administered if there be any great tendency to cerebral excitement. In the advanced stages, given in conjunction with the cautious exhibition of wine and other stimulants, it is decidedly beneficial.

Emetics have been much recommended by some practitioners, who state that they not only unload the stomach and small intestines, but in great measure aid in relaxing the skin, and in bringing on a favourable state of perspiration.

The Maltese physicians, as well as the Egyptian, are favourably disposed to the free use of vegetable acids, and particularly lemon juice. The nitric acid taken much diluted as a common drink has been found very beneficial. It has also been used in the form of a bath, but without success. (*Macgregor's Medical Sketches.*)

Frictions with warm oil have been in some cases found very serviceable, so much so, that Luigi of Pavia, who for twenty-seven years superintended the pest-house at Smyrna, states them to be more efficacious both as a prophylactic and as a means of cure than any other course. Subsequent experience does not, however, fully bear out the sanguine expectations of Luigi. The result of

their employment in the French army in 1798 and 1799 has induced the physicians who accompanied it to declare them to be totally inefficacious, and even to speak of them as injurious from the fatigue they entail on the patient.

The local treatment for the most part is very simple, amounting to the application of bread and water poultices to the buboes, and mild ointments to the carbuncles: occasionally, if there be deficient action, some of the digestive or resinous applications may be substituted. A great point to be attended to is, to obviate the tardy rise of the glandular swellings. Many of the French surgeons speak very favourable of the use of the actual cautery and the potassa fusa. Bulard speaks highly of the artificial formation of buboes by irritating the neighbouring lymphatics. He says, experience taught him that there is every probability of recovery, when, at the commencement of the disease, carbuncles with broad bases made their appearance, and when the buboes in the groins and axillæ were developed quickly, and ran on speedily to suppuration. In consequence of this, he inoculated those patients in whom these symptoms were wanting, causing thus artificial buboes and carbuncles; and the majority of persons so treated recovered.

Clot Bey in a letter to Dr. Chervin (*Brit. and For. Med. Rev.*), thus sums up the line of treatment to be pursued:—"The first symptoms are pains in the head, nausea and vomiting, injected eyes, staggering walk, as if from drunkenness, &c. At this period, emetics and diffusible stimuli may be tried. On the second or third day there is mental confusion, sometimes delirium; the tongue is dry in the centre, with red edges; the skin hot; there is often pain in the epigastrium, rarely diarrhœa, buboes, and carbuncles. There is now actually irritation in the digestive canal, brain, and lymphatic glands, and bleeding and cupping are employed, with cauterisation of the buboes and carbuncles to fix the irritation in the skin. On the fifth and sixth day petechiæ and blue patches on the skin; revulsions to the extremities." This treatment has apparently saved some patients.

Such is a sketch of the modes of treatment which have been resorted to in plague; but meagre and unsatisfactory as it is, our feeling in regard to them must yet be still further depressed, when we find a recent writer stating that, after five months' experimenting with all kinds of treatment, and all modifications of it, in about 1000 cases, he at last arrived at the melancholy conclusion, that though the medicines produced their effect upon the organisation, yet the malady neither ceased nor changed.

INTERMITTENT FEVER.

Characteristics of intermittent fever. — Premonitory or forming stage. — Symptoms of the paroxysm — the cold stage — the hot stage — the sweating stage. — Apyrexial period. — Anomalous symptoms occasionally observed in the different stages and in the intervals. — Circumstances which determine the type or form of intermittents.— Description of the quotidian intermittent— of the tertian — of the quartan. — Deviations from the ordinary course of the paroxysm. — Modifications of type. — Inflammatory. — Congestive. — Malignant. — Complication of intermittents with local affections. — Gastric complication. — Cerebral complication. — Pulmonary complication. — Cardiac complication. — Syncopal or fainting ague. — Splenic complication. — Diagnosis.—Prognosis.—Terminations. —Anatomical characters.— Numerical statement of the frequency of lesions. — Statistics. — Nature. — Exciting causes. — Treatment.

Intermittent Fever is so called from a very marked series of phenomena which take place during its progress. The chief characteristic is, that a paroxysm of

fever is followed by a cessation of all febrile symptoms, which apyrexial period usually lasts during a well defined period, and is very constant, though differing in duration in the various forms of this disease. The definitions which various authors have adopted are all founded on this peculiarity. Dr. Cullen describes intermittents as "fevers arising from marsh miasmata, consisting of many paroxysms, without fever, or at least with evident remission, returning with remarkable exacerbation, and in general with shivering, one paroxysm only taking place each day." This definition is far from being unobjectionable: that of Dr. Eberle is both more comprehensive and succinct, its generic character, according to this writer, consisting in "a succession of periodical paroxysms of fever, each paroxysm commencing with chills and terminating in free perspiration, with protracted intervals of perfect freedom from fever." (*Practice of Medicine*, p. 59.)

Premonitory stage. Fever in the various forms in which it ordinarily occurs is almost always preceded by a condition known as the premonitory or forming stage: this includes the period intervening between the first deviation from health and the commencement of the febrile paroxysm. It has been stated by some observers, that this antecedent stage does not precede intermittent fever. Most writers however describe it; and there can be no doubt, though it may not always occur, that it yet happens sufficiently often to justify its being considered as a part of that derangement from healthy action, which is consequent upon the accession of this disease. The symptoms which characterise this stage are not uniformly very definite. They are illustrative of that state which may be termed febricula. The patient feels tired, complains of slight headach and aching pains in his loins, and perhaps in his limbs generally, frequently with fits of yawning and stretching. The functions of the stomach are impaired, evinced by loss of appetite, flatulence, and constant thirst. The pulse is frequent, the skin is hot and dry, the urine high-coloured, depositing on cooling a red sediment, and the fæcal discharges are dark-coloured and offensive. This state lasts in some cases for a day or two, in others extends to a period of ten days or a fortnight, there being usually a marked increase of the symptoms about midday. They eventually terminate in a rigor, which is the commencement of that series of phenomena which constitute the *paroxysm* of intermittent fever. This premonitory stage does not however appear in the intermittent type to follow the same laws in reference to the fever itself as is observed in the continued forms: in these latter the shorter the premonitory stage the more violent is the fever, while in intermittents the reverse is usually the case. This may probably depend on a difference in the nature and intensity of the remote febrific cause, or on the powers of reaction being very different in these several diseases.

When the premonitory stage has been superseded by the characteristic symptoms of intermittent fever, a new series of phenomena takes place: these are a paroxysm of fever alternating with a period of intermittence.

Symptoms of the paroxysm. The paroxysm of fever consists of three well-marked stages: — 1. The cold; 2. The hot; 3. The sweating.

The *cold* stage is first ushered in by a sensation of some slight chilliness, with feelings of languor and long fits of yawning, which render the patient sensible of the febrile accession before it is suspected by others. The toes and last joints of the fingers lose their temperature and feel benumbed, and the nails have a bluish cast. This early period of the paroxysm is sometimes attended by pains in the back and loins, sometimes by headach and even stupor. The cold stage may now be said to have fairly set in: the patient is weary and restless, and complains of diffused aching pains; the ideas crowd rapidly on the mind, and the attention is with difficulty fixed; there is much oppression about the præcordia, with a squeamishness of stomach; the sensation of chilliness increases, and is experienced in defined lines, as if small streams of water were trickling down the back, shoulders, chest, and abdomen, until the coldness pervades the whole frame: these feelings at length become so real and intense

that the patient buries himself beneath the bed-clothes, and craves for warm drinks: the teeth chatter, the limbs shake, and in fact the whole frame participates in the general commotion, for the internal as well as the external organs are affected by the tremor. During the continuance of the rigor, as these symptoms are technically called, the patient complains of fatigue, the muscular strength being gradually exhausted, the sensibility of the surface diminished, the expression of the countenance pinched, the features shrunk and pale, the eye dull, sunk, and hollow, and the cheeks and lips livid and collapsed The skin generally becomes pale and assumes a rough appearance, not unlike that condition which is termed "goose skin;" in many cases so contracted, that rings previously tight drop from the fingers, and tumours on the surface, if they exist, become shrivelled. The pulse is small, contracted, and firm, generally quick, but sometimes slow and occasionally intermitting; the *tremor artuum* however interferes much with a just appreciation of the precise number of its pulsations. The respiration is hurried, anxious, and oppressed, attended by a sense of weight, tightness, and incapability of taking a deep inspiration, frequent sighing, and not unfrequently by a short dry cough. The head aches; the mind is embarrassed, dejected, and confused; and the patient is quite incapable of fixing the attention steadily on any given subject; occasionally there is delirium. Dr. Macculloch lays much stress upon the presence of a peculiar irritability of mind, to which the patient never becomes reconciled, however much he may to the other concomitants of the cold stage. He states it to be very constant even in those chronic cases where scarcely any other symptoms are very conspicuous, and that it in fact constitutes at times the sole characteristic of the cold fit. (*On Marsh Fever*, p. 245.)

In those of a debilitated constitution, especially if there exist any tendency to plethora, a severe attack of the cold stage is frequently attended by drowsiness, if not by deep coma: the mouth and fauces are dry and clammy, but the tongue is moist; the thirst is urgent and continued; the urine is copious, clear, colourless, and does not deposit a sediment on cooling; the dejections are dark and bilious. Towards the conclusion of the attack nausea supervenes with occasional vomiting; this sometimes occurs to a severe extent. Sooner or later however the chills begin to abate, transient flushes of heat pass over the face and body, the chilliness now recedes rapidly, and the heat encroaches, *pari passu*, until it obtains a complete ascendancy.

Such are the usual symptoms of the cold stage: its duration is very various, rarely continuing less than half an hour or more than four. It is a fact well worthy of remark, that occasionally, when the most intense feeling of universal cold is present, though the extremities are chilly, the heat of the body itself is above the natural standard.

The *hot* stage, which is one of reaction, gradually succeeds the cold, the one running into the other without evident or distinct interval. This stage is characterised by a flushed and turgid countenance: the surface of the skin is dry, and its temperature raised much above the natural standard; Fordyce observed it as high as 105°, while Mackintosh says that he has seen the thermometer, the accuracy of which had been well-ascertained, rise even in this country to 110°, and that in warm climates it is said to rise to 112°. The mouth is dry, the tongue parched, and the thirst excessive; the pulse is full, strong, and free; the respiration hurried and oppressed, though not to the same extent as in the cold stage; the urine is scanty, high-coloured, putrifying soon, but not depositing a sediment. The patient generally complains of acute pain in some part of the body, very often in the forehead and lumbar regions, and not infrequently in the thorax, left hypochondrium, and extremities. The whole expression is that of restlessness, general uneasiness, and oppression about the præcordia: the senses are acute, unless, as frequently happens, delirium supervene a short time before the commencement of the succeeding stage. The hot stage is more irregular in its duration than the cold; it rarely continues less than three hours or more than twelve.

The *sweating* stage commences in a perspiration, which, appearing first on the forehead, breast, arms, and legs, soon becomes general and profuse. No statements have been made by the observers of this disease, by which we are enabled to calculate the quantity of fluid thus excreted, but there is reason to believe that it is very considerable. During the course of this stage, the pulse, though it continues full, loses its hardness and frequency; the breathing becomes free and natural; the urine retains its high colour, and deposits a light red lateritious sediment: the bowels are more easily acted on; the heat of the skin subsides; the headach and thirst abate; the appetite returns, and there is a gradual subsidence of the febrile symptoms: in fact this stage continues until a perfect remission, or state of apyrexia, is established. On this taking place the patient is frequently enabled immediately to return to his duties as if in full health; sometimes however a profound sleep comes on, which may last for some hours, when the patient awakens refreshed, and free from lassitude; others however, especially in long-standing cases, labour under a feeling of excessive weakness.

The stage of *apyrexia*, or intermission, though it may be entirely free from the phenomena understood to be characteristic of fever, must by no means be regarded as a state of health. Generally speaking, the countenance is sufficiently expressive of this, having a pale and sickly aspect; the mental and bodily powers are excited only with great effort, and are easily exhausted and fatigued, a general languor pervading the system; the appetite is indifferent, and the digestive functions are carried on imperfectly; there is also a remarkable sensibility to cold, and a want of power to resist its effects, the function of generating and preserving animal heat being evidently deficient.

Such is the ordinary course of the febrile paroxysm, and of the period of intermission in an intermittent fever. Independently of the differences in the relative duration of each of these, and which will afterwards be particularly pointed out, there are other peculiarities which require notice: —

In the cold stage the chills are sometimes very partial, being confined to one or more parts of the body: for example, there are instances of a single limb being the seat of this stage; sometimes again it is so slightly marked as to amount only to the slightest sensation of chilliness creeping along the back, and over the extremities; or perhaps there may be only severe headach, or a lethargic state, or great languor with distressing yawning: occasionally the paroxysm is announced by violent articular, lumbar, or frontal pains, and sometimes the patient falls into a profound sleep for several hours, and awakes in a violent hot stage. (Mackintosh's *Practice of Physic*, vol. i. p. 63.) These forms are vulgarly known by the name of the dumb ague: now and then a nervous pain of the brow following the course of the supraorbitar nerve, resembling an attack of tic douloureux, takes the place of the usual symptoms; and Dr. Eberle has known this stage to commence with violent vomiting, and to terminate speedily in stupor and partial insensibility. (*Op. cit.*, vol. i. p. 61.)

In the sweating stage the anomalies are frequently very conspicuous: occasionally the pyrexia may have been very intense and prolonged, followed by very slight perspiration, or even only a clammy moisture; sometimes a copious flow of urine, or even diarrhœa, appears to supersede every other symptom. These variations from the usual course were very frequently observed in those who had returned with intermittent fever from the Walcheren expedition. (Davis, *on the Walcheren Fever*, p. 19.) Andral mentions the very curious case of a young man who had been hemiplegic on one side of his body from infancy, and who was attacked with tertian intermittent. He only perspired on that half of the body which had not been paralysed. He stated, however, that in his best health he never perspired but on one arm and leg, and one side of his face and neck. Instances of irregularity are also on record, in regard to an inversion in the natural order of the cold, hot, and sweating stages; these however are of very rare occurrence. According to Dr. Davis, anomalies were as frequently observed in the intervals. In those who had returned from the Walcheren

expedition, he observed that the paroxysms often left the appetite impaired, the rest disturbed, and frequently induced drowsiness approaching to coma, prostration of strength, dejection of the spirits, emaciation of the body, irregularity, sometimes vitiation or suppression, of the secretions. In a few instances the intermission was protracted for a week or ten days, the patient during this time being harassed with visceral obstruction, while there was disinclination or inability to exercise the mental or bodily faculties. The disease, instead of subsiding, appeared only to cease for a moment, in order, when the paroxysms were renewed, to attack with greater vigour the internal organs, more especially the viscera of the abdomen; and when inflammation supervened in organs previously affected with organic disease, the structural lesions were increased, and quickly induced dysenteric affections and ascites. It has occasionally happened that patients have been seized, after the paroxysm had passed over, with pain in the head, and a confused state of intellect, terminating two or three days afterwards in complete coma: sometimes a continued pyrexia with disorder of the stomach has prevailed, indicated by whiteness of the tongue, distension, epigastric uneasiness, and anorexia: in some, the bowels become painful, with a tendency to diarrhœa, the evacuations being mixed with blood and mucus: in others there are wandering pains of the head, chest, and abdomen, or lumbar pains, strangury, and bloody urine, flushing and œdema of the face, languor, dejection, and general indifference; sometimes the pulse is quick, at other times slow, intermitting, or irregular. In addition to several of these symptoms, the patient is occasionally attacked during the intermission with rigors, slight exacerbations of fever of a hectic kind, followed towards evening by a cold clammy moisture upon the arms and breast, excessive thirst, sometimes palpitations of the heart, cough, and difficult respirations. Whenever these phenomena are present, and a paroxysm is about to supervene, they disappear in the greater conflict the constitution is about to be engaged in: but when the paroxysm has passed over, several of these anomalies reappear; so that the patient even in the interval may never be left perfectly free from very obvious ailments. It is unnecessary to enter more fully into the irregularities which occasionally take place during the intermission. From what has been stated it is apparent, that though during this period or interval the patient may remain free from any uneasy sensation, there may be more or less evidence of undefined indisposition.

The alternations of the period of intermission, with the febrile paroxysm described, has given the name whereby this class of diseases is distinguished. Experience has taught us that this alternation occurs with a regularity so marked, that we are enabled to infer the time at which the paroxysm will recur. This periodicity generally discovers itself between the close of the first and the commencement of the second paroxysm. Hence is determined the type or form of intermittent fever, to which the particular case belongs, and which it maintains, speaking in general terms, during the whole course of the disease, not only as regards regularity in the recurrence of the paroxysm, but likewise as to the length and severity of the different stages of the paroxysm itself, it being almost uniformly found that the hot stage is determined in its character by that of the cold, and the sweating by the character of the other two together. These exacerbations of fever and intermissions are so well-defined and so constant in their succession, as to permit the varieties of the disease to be designated by terms sufficiently expressive of the period of recurrence. Nevertheless, irregularities sufficiently striking occasionally present themselves: sometimes the paroxysm is protracted beyond its proper period, sometimes the regular time for its return is anticipated, or it may be delayed. The phenomena of the disease however bear so general a relation to each other, that the following may be almost regarded as its proper or peculiar laws:—1. The shorter the intermission the longer the paroxysm; 2. The longer the paroxysm, the earlier it commences in the day; 3. The more durable the cold stage, the less durable the other stages.

We shall now proceed to describe the varieties of intermittent fever:—1. *The*

quotidian; 2. *The tertian*; 3. *The quartan*; 4. *The irregular*; 5. *The complicated.*

1. The *quotidian* intermittent is characterised by its intermission occurring every twenty-four hours. In this type of ague the intermission is shorter than in any other, while the paroxysms are the most protracted, occasionally extending to eighteen hours. The paroxysms commence generally in the morning: in fact it is doubtful if the disease can ever be considered a true quotidian, if they commence after noon or during night. They are usually in these cases symptomatic of some local affection. The quotidian but rarely occurs, in fact more rarely than is generally supposed; for hasty observation has frequently led to the confounding with this type the more commonly occurring double tertian. In this latter, however, the paroxysms are not equally severe, the alternate ones bearing a relation to each other, while in the quotidian they each are of similar character.

The paroxysm of quotidian is ushered in by a slight sensation of cold, or rather a chilliness only; it is usually attended by much gastric derangement, as heartburn, nausea, with distension of the epigastric and hypochondriac regions; the pulse is irregular and weak, the urine pale and thin. In some cases other symptoms supervene, as headach, diarrhœa, or vomiting. This stage commonly lasts about three hours. The hot stage is characterised by thirst and a general warmth, rather than an intense heat; the patient is frequently drowsy; the pulse becomes quicker, but does not acquire hardness; the urine is turbid. This condition lasts perhaps for two hours or more, when a protracted but slight perspiration announces the sweating stage. The whole of the paroxysm occupies about ten or twelve hours. The intermission which succeeds is not entirely free from morbid feeling, the patient usually experiencing some degree of heaviness and mental oppression: it lasts usually for twelve or fourteen hours, but in severe cases it may not exceed six.

The continuance of quotidian ague is much influenced by circumstances, as the age and constitution of the patient, the season of the year,—the autumnal and winter attack being always more severe than that occurring in the spring. It is often protracted in its course, especially when it occurs in those of lax weak fibre; its usual progress to a cure being in such cases the transition into a tertian. This type of the disease often assumes many peculiarities: occasionally the paroxysms are so extended, that there is scarcely any intermission, or at all events it is very imperfect; so that the whole period between the paroxysms is not free from febrile symptoms: this has been termed the *continued quotidian.* Dr. Fordyce has particularly described another variation under the name of the *anticipating quotidian*, in which the paroxysm, instead of recurring at its usual time, sets in about two hours before; and this happens in every attack, so that its recurrence may take place at any period of the twenty-four hours instead of at the regular time.

The *retarding quotidian* is the counterpart of the anticipating, its paroxysms being daily postponed for two hours.

2. In the *tertian* ague the paroxysm commences every forty-eight hours; it is the most frequent of all the types of intermittent fever. The paroxysms usually commence about noon, and rarely last so long as eight hours; six are understood to be the fair average time. Their duration is consequently less than in the quartan ague, and in this respect there is a deviation from the general law.

The premonitory signs of the cold stage are, overwhelming languor, continued yawning, and stretching of the limbs, creeping sensation over the surface, followed by a feeling of coldness down the back; occasionally, though very rarely, this feeling of coldness commences in one of the extremities, or on one side of the head. To these symptoms succeed the rigor, which is peculiarly intense in the tertian variety. It is attended by severe general and lumbar pains, and by anxiety and alarm; a feeling of nausea supervenes, and as this increases the pain subsides; vomiting, first of the contents of the stomach and

afterwards of bile, succeeds, which is the termination of the cold stage. Though this stage sets in severely it is not of long duration, rarely exceeding an hour, and not infrequently lasting less than half that time. The succeeding or hot stage, as regards the individual paroxysm, is however disproportionately long: it is not characterised by any symptoms very different from the usual hot stage in other agues; the heat is intense, and the thirst continued. It may continue for three hours, when it gradually subsides under the influence of a free perspiration. The period of apyrexia in this form of intermittent is often attended by much general derangement, as weakness, loss of appetite, headach, &c.

Of all the varieties of ague the tertian, when uncomplicated by any other disease, is the least dangerous, especially when it occurs in the spring; those that occur in the autumn are more obstinate, and change, at times, into the quotidian, or the double tertian. In favourable cases it may subside after the fourth paroxysm: it often does so after the fifth, but more generally after the seventh or ninth; occasionally the disease subsides on the appearance of a scabby or vesicular eruption: the occurrence of any little cutaneous disease about the nose and mouth may be almost considered as critical. This type of intermittent occurs more frequently in adults than in children, and in those of robust sanguineous temperament than in the leucophlegmatic. It is often complicated with chronic diseases, especially of the stomach and liver, and with dysentery.

The irregularities which occur in tertian ague are very numerous, and of frequent occurrence: they may, in great measure however, be included under the heads of double and triple tertians.

In the *double tertian* the recurrence of the paroxysm takes place daily, so that two fits and two intermissions occur in the forty-eight hours; and on which account, as previously noticed, it may on slight observation be confounded with quotidian. It differs somewhat from this latter in the paroxysm not occurring in the morning, but more particularly in the alternate ones being similar, while those immediately following each other are not so: thus the paroxysm of the first day comes on at noon, and goes through its stages as is usual in a tertian; on the following day the period of apyrexia is obtruded upon towards evening by a slighter paroxysm; on the third day the phenomena are the same as occurred on the first day, and on the fourth as on the second; so that the paroxysms occurring on the first, third, and fifth days represent those that belong properly to the type of ague, while those occurring on the second, fourth, and sixth days are those which constitute the variety, and are the irregular addition to the disease. Dr. Davis, who says this is the most common type of the fever, describes it as attacking at all hours, generally beginning with nausea, extreme lassitude, and sense of cold, extending from the shoulders to the bottom of the back; that in the cold stage, independent of the usual symptoms, the dejection of spirits increases so much "as in many instances to approach syncope, resembling a fever termed by the ancients *Syncopalis.*" The symptoms attending the paroxysms he has detailed at great length and with much minuteness; but as they are not essentially different from those already stated, it would be useless to dwell upon them here.

Some of the irregularities of the double tertian are not, however, uninstructing. The cold stage sometimes consists of a rigor only, followed, after the space of an hour or two, by great heat, continuing for an uncertain number of hours, varying from six to eight. In the slight and irregular paroxysm, ushered in frequently by rigor and moderate febrile symptoms, the termination is always more confused and incomplete than in the severe paroxysms of the previous or following day. On the termination of the fit being tolerably complete, there yet remain symptoms which are very distressing, such as acute pain in the chest, stomach, or head. If the pain in the head continue long, delirium or stupid drowsiness follow, and diarrhœa, sometimes dysentery and partial suppression of urine frequently occur. In the midst of the hot stage, palpitations of the heart,

cough, and vomiting, occasionally supervene, together with repeated hæmorrhages from the nose; many of which symptoms persist after the completion of the paroxysm, thus creating considerable confusion during the interval. The duration of the paroxysm is occasionally very uncertain, being much influenced by a complication of anomalous symptoms:—"It has occasionally lasted ten, twelve, fifteen, or twenty hours without coming to any distinct solution; nay, the stronger fit has continued till the slighter one has commenced, the two paroxysms becoming thus identified in one. The interval has in some instances really been so indistinctly marked, that the fever partook much of the continued or at least remittent form." Much irregularity also occurs in respect to the invasion of the paroxysms, now occurring regularly both as to period and duration, and then those immediately following varying in both these respects. Sometimes a variety is established which has been termed the *duplicated tertian*, in which, according to Cullen, two paroxysms occur on alternate days, while the intervening ones are days of intermission. Dr. Craigie describes it somewhat differently, the disease being introduced, according to him, with a mild fit in the evening, and followed by a more violent and complete one the succeeding day. On the evening of the third day again a mild fit appears once more, and is succeeded by a severe one in the same manner throughout the disease; so that, according to the usual mode of calculating the days of diseases by reckoning from the first hour of invasion, both paroxysms happen on the odd days, while a great part of the even days is calm and undisturbed.

In the *triple* tertian there are two paroxysms on the odd, and one on the succeeding days; so that in forty-eight hours there are three paroxysms and three intermissions. The mode of their occurrence follows somewhat this order. About midday the first paroxysm occurs and lasts for four or five hours; after a short intermission another takes place, which is protracted through the night; then follows an intermission during the greater part of the second day, which towards evening is intercepted by a paroxysm lasting through the night: on the third day the two paroxysms reappear as on the first, and on the fourth day as on the second, and so on throughout the disease.

3. The *quartan* ague is characterised by an intermission, commencing every seventy-two hours, the paroxysm generally lasting from five to nine, and commencing usually in the afternoon between the hours of two and five. Its cold stage is longer in proportion than in the other types, but is by no means so violent as in the tertian. Dr. Craigie however, on the authority of Burserius, describes the hands and feet as becoming cold, the whole body pale, the face and nails livid, succeeded by shuddering, and at last by convulsive shivering, trembling of the tongue and lips, frequent and oppressive breathing, with a sense of anxiety at the præcordia, and a shaking of the whole person with irresistible violence. In some instances this degree of cold and shivering does not take place in the first and second paroxysms; but in the subsequent ones it is always very violent, and has been known in some cases to break the teeth or dash them from their sockets. The cold stage is occasionally protracted to a period of two hours, and is very rarely attended by sickness or diarrhœa. After a duration of two or three hours it passes into the next stage, which is not attended so much by intense as by a troublesome dry heat; nor is the concluding stage marked by any very decided perspiration.

This form occurs chiefly in the autumn, very rarely in the spring. The subjects most liable to it are those in advanced years, and of a melancholic habit. Of all the types of intermittent it is the most obstinate and difficult of cure, generally remaining through the winter until the following spring. Celsus has remarked this particularly to be the case, should this form of ague become established in the constitution before the winter have set in. It is nevertheless a type of fever, which is very rarely attended by a fatal termination.

The deviations from the ordinary course of the quartan bear so much relation to those of the tertian already described, that it is not necessary to enter

at length upon them. A few words will suffice to show the nature of these variations: —

In the *double quartan* the true paroxysm takes place on one day, a slighter one on the second, while the third is a day of intermission; on the fourth day another paroxysm takes place, resembling that of the first, and so on in succession. The paroxysms occurring on the second and subsequent fourth days are those which represent the type of the disease.

In the *triple quartan* a paroxysm takes place daily, but they vary on the first, second, and third days; so that, as the disease progresses, the paroxysms which occur on the first and fourth, on the second and fifth, on the third and sixth, and so on successively, are respectively similar. Those occurring on the first and fourth days being the most complete, are the true quartan paroxysms.

In the *duplicated quartan* on the first day two paroxysms occur, while the second and third are days of intermission. In the *tripled quartan* these paroxysms occur on the first and fourth days with two days of intermission. These two latter varieties are of very frequent occurrence, but in their progress towards cure they usually pass into the true quartan.

The irregular agues are those whose periods of intermission are more protracted than in any of the preceding; and though to the hasty observer the recurrence of the paroxysms may appear to be irregular, yet, for the most part, they will be found to obey certain laws of periodicity. In these varieties the intermission which intervenes is protracted through the space of from five (called by Van Swieten a *Quintan*) to seven days, or even to a longer period. Dr. Craigie, however, thinks it exceedingly doubtful, that an ague should actually exist with periods of intermission so extended, and at the same time observe any so marked regularity in the accession of its paroxysms.

The whole class of simple agues together with their varieties are subject to certain irregularities in their paroxysms, which has given rise to a division into the *cold, burning,* and *sweating* agues — the accompanied agues of many writers. They occur however, most frequently, as deviations from the autumnal tertian.

In the *cold* variety the first stage is protracted, the surface remaining chilly, the pulse depressed, the countenance sunk, and the breathing anxious; no hot stage is perceptible; it gradually subsides into a clammy perspiration.

The *hot* variety is in its external symptoms very similar to the cold, excepting that, whilst the surface retains its coldness, there is felt within an excessive and most excruciating burning.

In the *sweating* variety the cold and hot stages are hurried through, and a protracted sweating stage supervenes. The perspiration is very copious, exhausting, and enfeebling. Each of these varieties is attended by much danger. We shall not, however, enter further into their discussion, as the irregularities in the paroxysm have been already pointed out.

4. In the *complicated* agues, one type may be converted into another,—the tertian and quartan into quotidian, or into double or triple tertians; quotidians and tertians into remittents, &c. A variety of the complicated has been termed the *subintrant*, in which the paroxysms approach each other so nearly as to be like remittents, excepting that the exacerbations are more marked.

The above may be stated to be the more usual forms in which intermittent fever occurs. Each type, however, is liable to certain modifications, which have their origin in idiosyncracy, or the presence of some general affection, or on what has been termed atmospheric temperament. These modifications, from altering very considerably the general character of this class of fever, render a true appreciation of them very necessary in a practical point of view.

The most important of these modifications are, 1. The inflammatory; 2. The congestive; 3. The malignant.

1. The *inflammatory* intermittent is characterised by its intermissions not being free from febrile symptoms, notwithstanding the sweating stage of the

paroxysm has been most complete; the pulse retains much of its quickness and tension; the thirst is constant and urgent; the skin harsh, dry, and warmer than natural; the whole tone of the system is irritable; the temper is fretful and discontented; there is headach, and occasionally aching pains transiently affecting the extremities, and sometimes slight pain of the chest attended by a short cough. In agues thus modified the rigors are exceedingly strong, and generally attended by vomiting. The paroxysms are usually protracted, and the intermissions are proportionally shortened. The quotidians are more apt to partake of this character than the tertians, and the tertians than the quartans. The vernal quotidians, occurring in the young and robust, are particularly liable to become so. Richter has observed that, notwithstanding the general severity of the symptoms, the secretions are rarely so vitiated as to cause gastric disturbance.

2. The *congestive* form of ague is throughout of adynamic character. The cold stage, which is much protracted, is ushered in by vertigo, deep-seated pain of the head, followed by general trembling rather than rigor. The pulse is small and weak, and not unfrequently faintings and coma add to the alarm. The hot stage struggles on slowly, and as it were unwillingly, and then is but imperfectly developed; so that, instead of the usual characters of this stage, there is only a low oppressed condition. The sweating stage is scarcely perceptible. The period of intermission is marked by a pale, worn, contracted countenance, general oppression of the system, constricted and anxious breathing, and small, hard, and frequent pulse. The surface of the body is colder than usual, with an incapacity of retaining the surface warmth at the same time that the internal parts feel heated and irritable. This modification of ague however seldom occurs, excepting in hot countries, where there is much prevailing marsh exhalation, and then only in those constitutionally nervous and irritable, or whose health has been impaired, and the powers of the system exhausted by previous disease. Boisseau states, that it occurs in quotidians, double tertians, tertians, and quartans; it sometimes takes on alternately these different types, whilst at other times they are irregular. (*Pyrétologie Physiologique.*) The duration of the congestive intermittent is but little known: it occasionally succeeds the adynamic continued fever; though, more frequently, it passes into the continued form. It is a peculiarly fatal variety of ague.

3. The *malignant* form of intermittent fever has been particularly described by Alibert. (*Traité du Fièvres Pernicieuses Intermittentes.*) After the second, third, or fourth accession of the febrile paroxysms, the cold stage becomes either shorter and more intense, or else very much prolonged; and in place of the phenomena usually attendant on the hot stage, urgent symptoms, hitherto not observed, show themselves; or those which had already characterised this stage are much exasperated. The sympathetic phenomena which specially characterise the febrile accession become less apparent, or cease almost entirely, while symptoms of local irritation, hitherto unperceived, become developed. Nevertheless, the paroxysm passes off without any very well-pronounced perspiration, but a fetid odour is often exhaled from the body. The patient in part recovers his powers and appetite, and sometimes even does not complain of any particular uneasiness. On the accession of the succeeding paroxysm, however, colliquative hæmorrhages and petechiæ often make their appearance; and not unfrequently death ensues at this period, or the disease may be protracted to the third, fourth, or fifth paroxysm.

Such is the outline of what French writers have termed *Fièvres intermittentes pernicieuses:* they usually occur in warm climates in persons of broken-down constitution, as well as when the intermittent fever is complicated with organic diseases.

Complication of Intermittent Fever with local affections. Complicated intermittents, both from the nature of the lesions and from their frequency, are of the highest importance; we shall therefore describe the more prominent local affections.

It is not always easy to determine whether these local lesions are primary or secondary, or to what extent they constitute the danger. It is also to be kept in mind, that some peculiar state of the atmosphere, or the peculiar nature of local miasm, or both, exert a powerful influence on the general character of the fever, while individual cases are greatly modified by peculiar idiosyncrasy: thus, in those of plethoric habit the brain is much affected, and in such persons there is a tendency to delirium; in those of a nervous or irritable disposition, in addition to the other symptoms, there are spasms and twitchings of the tendons; and individuals who are predisposed to rheumatism suffer much from acute arthritic pains. (*Good.*)

The most frequent complication, and one attended with much danger, is that which is termed the *gastric;* in which there is inflammation of the mucous membrane of the stomach. The symptoms are, excruciating pain in the epigastrium towards the cardiac origin of the stomach, from which Boisseau has called it, *La fièvre pernicieuse cardialgique:* the pain is of a gnawing or tearing character, attended by nausea and sometimes vomiting; the countenance is pale and altered; the pulse is quick, and small, or even scarcely perceptible; the skin hot; the tongue dry, brownish yellow or bright red; the urine scanty, high-coloured, and of a yellow tinge; the thirst urgent; to which succeed hiccough, great prostration of strength, impaired vision, and hurried breathing. These symptoms supervene after a short shivering fit at the commencement of the hot stage. When the liver partakes in the morbid action, the febrile paroxysm is preceded by frequent copious evacuations, intermixed with portions resembling broken-down flesh, or dark blood partly coagulated and partly liquid, the fluid which is vomited being of the same description.

The prostration of strength in such cases is extreme; the pulse feeble and small; the voice shrill; and the general surface of the body, but more especially the extremities, cold. On any attempt to rise from the horizontal position syncope often takes place, an event which is always much to be dreaded, as the powers of reaction are very feeble. According to Boisseau, all the symptoms of the atrabilious or hepatic intermittent indicate violent irritation of the intestines, in which there is more or less intense sanguineous engorgement.

When intermittent fever is complicated with *cerebral* disease, it takes on various forms, the symptoms of urgency being generally however referrible to the head; acute lancinating pains are felt, more particularly over the frontal region and in the orbits; the sight is impaired; there is great sensibility to light, the retina appearing to be in a state of the most excessive irritability; there is at the same time painful tinnitus aurium, with intolerance of sound; in short, the group of symptoms indicate that the membranes of the brain are inflamed. When coma is superinduced, it generally sets in with a drowsiness towards the end of the cold, and beginning of the hot stage; the pulse is slow, at one time full, at another small; the eyes are fixed, the lids half open and immovable; the expression of the countenance deathlike; and the patient mutters, replies with difficulty, appears inattentive, asks questions, and then forgets them. During all this time he appears perfectly sensible of the inaccuracy of his mental powers, and appears labouring to collect his ideas. If the coma become complete, the breathing is stertorous. In this state the patient usually remains for the space of one or two hours, and then continues free until the following paroxysm. At other times the paroxysm is accompanied by delirium. This state is attended by thirst, hot skin, feeble pulse, great efforts being generally made at muscular exertion, with constant desire to leave the bed.

Cerebral intermittents have also been attended by convulsions; by epileptic fits (*Lautter*); by spasm of the glottis, resembling in many respects the paroxysm of hydrophobia (*Dumas*); by loss of voice (*Double*); and by paralysis (*Molitor* and *Sonquet*): in fact, when cerebral inflammation takes place as a complication of intermittent fever, all those consequences which are usual on the simple inflammations of the brain and its membranes are developed during the paroxysm. Dr. Brown (*Cyc. of Pract. Med.*) states, that the symptoms which are distinctly referrible to the brain and its membranes are of two

orders, — those of spasm or convulsion, and those of coma or oppression. Amongst those of the former, he says, there is not merely the ordinary subsultus of fever, but well-marked convulsive movements, such as the rapid contraction of the flexor and extensor muscles of the fore-arm, convulsive twitchings of the fingers, occasionally tonic spasms of the same parts or of the lower extremities, so that the flexors and extensors being balanced, the members acquire a tetanic rigidity, firm clenching of the lower jaw, and violent rolling or distortion of the eyes. The signs of diminished sensibility are stupor, from which it is difficult or impossible to rouse the patient; immobility; incapability of swallowing; eyelids wide open; pupils occasionally dilated, sometimes morbidly contracted; pulse sometimes strong and bounding, at others small and feeble; and stertorous breathing. Should both sets of symptoms occur in the same patient, it will generally be found that those of convulsion precede in point of time, though in the close of the disease they are found coexisting. Dr. Brown quotes M. Lallemand as considering the first set of symptoms — those of convulsion — to arise from inflammation of the arachnoid membrane, communicating irritation to a healthy brain, or at least to one retaining its functions to a certain extent; while the second — those of coma — are due to inflammation of the cerebral substance itself. It is certain that convulsive movements are compatible, and are indeed generally found coexisting with coma, more or less considerable; but the opinion of M. Lallemand is supported by the facts, that in those cases of comatose intermittent, in which there are convulsive movements, the patient is still capable of being roused to a degree of attention, and to display some share of sensibility; and that in cases of coma without convulsion, the marks of cerebral inflammation are more considerable than in those in which convulsions existed. The cerebral symptoms usually come on suddenly, though rarely until after a series of paroxysms have taken place. They require the most prompt and judicious attention; for not only are they frequently followed by a state of complete and permanent idiotcy, but occasionally death itself ensues suddenly during a paroxysm. Sydenham however, who had observed, that after a reduplication of the fits and repeated evacuations patients were often seized with madness, states, that as their strength increased, and they otherwise began to recover, this state proportionably subsided; but in another place he adds, "it may however be proper to take notice of a considerable symptom, which neither yields to purging, nor any other evacuation, and especially not to bleeding, but is rendered more violent thereby. This is a peculiar kind of madness, which sometimes follows upon inveterate intermittents, especially quartans, and yields not to the ordinary method of cure, but after copious evacuations degenerates into a lamentable kind of folly for life," (*Works by Swan.*) Moseley states that Dr. Charles Irvine informed him, that, when on the Spanish main, the delirium which commonly came on in the paroxysm of the fever, after a few returns of it, sometimes remained during the intermissions, which soon become irregular from reduplications of the accessions; and that several men wandered about in a frenzy, and died raving mad. Moseley himself says, that he has frequently observed that the mind has been greatly impaired after irregular and harassing intermittents; and sometimes that a temporary insanity ensued. (*Tropical Diseases.*)

When intermittent fever is complicated with disease of the *pulmonary organs*, there is generally, during the paroxysm, intense pain of the chest aggravated on inspiration, dyspnœa, cough, thirst, dry tongue, small and quick, afterwards hard and frequent, pulse, general feebleness, and universal chilliness. Cases of this description usually set in with a violent rigor. If there be a sharp pain on either side, it may generally be inferred that the pleura is affected. The state of a patient under such circumstances is imminently hazardous. Dr. Davis states, he never found intermittents so dangerous as when the original fever was combined with pneumonia or hydrothorax. Laennec relates a very interesting case of this nature, which is important as establishing the fact, that the physical condition of peripneumony was present during the accession, and

subsided afterwards. Towards the middle of the paroxysm the *rale crepitante* was heard, and there was also a slight hæmoptoë. Dr. Stokes has likewise detailed a case in many respects similar to this. (*Edin. Med. and Surg. Journ.*, vol. xxxi.)

When complicated only by simple catarrhal affection, the symptoms are not essentially different from the above. The only points of distinction are, that the cough is not dry, the eyes are more suffused, and the face is red and swollen. Should the cough however be severe, headach supervenes, and sometimes convulsion, followed by a state of drowsiness.

If complicated with asthmatic symptoms, though there be no pain, yet the respiration is so difficult as to threaten suffocation. This symptom is most alarming. In these cases, although there is much short and distressing cough, there is no expectoration.

When complicated with disease of the *heart*, there is palpitation with pain in this region. These symptoms occasionally exist to so great an extent, as to induce those indefinable sensations which precede syncope. All the senses but that of hearing are abolished, and the patient attempts to speak but cannot. During this state the arterial pulse and respiration appear to have entirely ceased, and the beatings of the heart are very feeble and slow. This state usually lasts for a quarter of an hour; at times it is protracted to an hour or even two.

In that variety which is termed the *syncopal*, the patient loses knowledge of all impressions for a short time; and, on recovering, complains of no pain nor other inconvenience, excepting that resulting from extreme languor and feebleness. The symptoms attending a paroxysm of the fainting ague are small, depressed, and frequent pulse, hollowness and dullness of the eye, the head and neck being covered with a most profuse perspiration. It generally proves fatal after five or six attacks.

Disease of the *spleen* is very frequent in intermittent fever, so much so, that certain alterations in its structure have acquired the name of *ague cake*. Dr. Davis thinks that the diagnosis may be deduced from the "leaden green and bloated appearance of the face, the debility and listlessness of the whole body, as well as from the accessions of fever which are truly hectic."

This list of the complications of intermittent fever with local disease might be greatly extended: we might detail the *icteric*, the *cystic*, the *uterine*, the *algide*, the *petechial*, &c.; in fact, authors might be quoted who have described its occurrence under a vast variety of anomalous circumstances, and in conjunction with the symptoms and lesions of almost every local and general disorder. To enter upon these, however, would be very tedious, and rather curious than useful. We may however incidentally remark, that the peculiar affection of the nerves, termed *tic douloureux*, often takes on a very marked periodicity; and that its occurrence under such circumstances in the branches of the supraorbitar nerve, has acquired the term of *brow ague*.

Diagnosis. The diagnosis in intermittent fever is by no means difficult, the only affections with which it may be confounded are remittent and hectic fevers; the former however never has a complete apyrexia, nor are the cold and sweating stages very perfectly pronounced. In hectic fever the accession takes place daily, and in the afternoon or towards night, thus differing from the quotidians and double tertian, the only forms of ague likely to be mistaken for it. Besides, in hectic fever the sweating stage is more prolonged, and the pulse, during the intermission, retains more of its febrile character, continuing small and rapid.

Prognosis. The prognosis in intermittent fever depends on a variety of circumstances. The probable result is in some degree influenced by the type of the fever itself, by its epidemic character, by the age and constitution of the patient, and by the situation in which he resides.

In general terms we may state, that in England intermittent fever, when

uncomplicated with local disease, is to be considered amongst the least dangerous of the class to which it belongs: it must be borne in mind, however, that occasionally the simple intermittent proves fatal, and then generally in the cold stage. The history of such an event usually is, that cerebral congestion ensues, which terminates in coma or apoplexy. This is especially the case where a predisposition to cerebral fullness has previously existed. In those countries however, where to the baneful influence of excessive temperature is added the effects of marshy swamps, these fevers prove eminently fatal, ever showing a tendency to pass into the malignant or remittent forms.

When intermittent fever occurs in those who are young and of vigorous constitution, it is much less dangerous than in those who are weak and debilitated, or whose habits have been dissipated. Death amongst these latter frequently ensues during the cold stage, from their stamina not being equal to effect that degree of reaction which is necessary to rouse the system from its depressing influence; and they succumb to the coma which is thus induced. The form and pathological condition of the fever itself likewise influence the result: tertians are the most easy of cure, quartans the most obstinate, but the least fatal, while quotidians are the most fatal. As in other acute diseases we find epidemic influences giving to ague at one time a character of fatality which does not belong to it at another.

Its complications with other diseases, and its assuming of itself the malignant form, are circumstances which must be well-weighed before pronouncing an opinion as to the probable result. Supposing, however, all things to be equal, it may be stated in general terms, that the favourable signs are, regularity during the progress and in the recurrence of the paroxysms, or in their being retarded; complete reaction after the cold stage during the intermission; the digestive organs performing their function properly, especially if there be present no signs of inflammation in the stomach or intestinal canal; the return of discharges which had been suspended; the appearance of scabby and humid eruptions about the nose and mouth, &c.

The circumstances which indicate an unfavourable prognosis are, irregularity in the recurrence of the paroxysms, especially if they become anticipated, or show a tendency to assume the remittent and continued forms, which changes are particularly favoured by whatever is capable of causing or augmenting the general inflammatory condition of the system, or by the supervention of some local inflammation. These complications have been shown to be particularly severe in their nature, and are generally fatal. An unfavourable character of disease during the paroxysm is indicated by general weakness, difficult and oppressed respiration, hiccough, sighing, coma, and delirium; and, during the intermission, by debility of the stomach, deranged digestion, tumid and hard abdomen, loss of strength, tendency to dropsical effusions, difficulty of generating or retaining warmth, dyspnœa, bloody urine, &c.

The *terminations* of intermittent fever are very various, depending much upon the constitution of the patient, the duration of the disease, and the virulence or intensity of the exciting cause. The conviction of those who have had ample opportunities of witnessing the occurrence of these diseases is, that there exists a natural tendency in them to terminate favourably of themselves. Dr. Eberle states, his own observations have led him to conclude that, if not controlled, or embarrassed by external influences, quotidians when simple and regular show a disposition to complete their course on the seventh day; tertians on the fourteenth; while quartans generally run on to the sixth week. It is not to be expected that, under such circumstances, they will always terminate spontaneously at these several periods; but that their tendency to do so is so strong that, if assisted by a febrifuge, the disease will most probably be arrested. It is a curious fact in the history of intermittent fever, that occasionally a continued and obstinate autumnal ague is superseded by the milder vernal one, which running its usual course terminates in health, and apparently quite un-

influenced by the previous disease. We have alluded to the frequent termination of agues in a scaly or vesicular eruption, which makes its appearance about the nose and lips: its occurrence is considered critical.

Should the intermittent, instead of presenting this favourable history, be protracted, a state of impaired health becomes established. The condition of those who are thus labouring under its sequelæ is sufficiently marked. The countenance is pale, bloodless, puffed, and œdematous; the skin is generally opake, sallow, and inelastic to the feel; the eye is yellowed; the tongue furred, with a creamy slime in the centre; the pulse feeble, frequent, and peculiarly small; the whole appearance is exsanguineous; the appetite is capricious, and the system easily excited by ingesta which are a little stimulating; the alvine discharges are clay-like, or else of a dark liquid character, and always very offensive; the urine is deficient in quantity and tinged with bile; perspirations are easily induced, and of a fetid character; the epigastrium and hypochondria are tumid and tender to the touch; the respiration is short; and the whole expression is that of debility and weakness. This state frequently continues for years, under greater or less aggravation; ultimately however it terminates in dropsy or diarrhœa, which quickly put an end to the sufferings of the patient.

In hot climates death frequently takes place during the paroxysm. In the more temperate, the disease, when of a bad character, is prolonged and obstinate, giving rise to visceral disease. This is easily understood if the phenomena of the different stages of the paroxysm are borne in mind. It is very obvious, from the condition of the circulating system during the cold and hot stages, how a long continuance of the fever may produce disease of the liver, spleen, and pancreas; how the intestinal canal becomes the seat of severe secondary affections; and how irregularities in the functions of the heart and circulating system generally are established, and dropsy and other evils follow in the train. In the cold stage there is an evident remora of the blood, especially in the veins of the abdomen and portal system; hence arises immediate disturbance in the functions of the liver, as is fully shown by the dark-coloured dejections immediately following an attack. General reasoning sufficiently leads to the conclusion that this should be the case, but the fact is almost established by the greater derangement in the biliary functions which takes place in the quartan ague — the type in which the cold stage is the longest. In the hot stage the abdominal viscera are generally in a state of congestion, and thus prone to take on inflammation, and the lesions consequent to it.

When death ensues, it occurs either from the severity of the general disease overwhelming the vital powers, or from these being worn out by the effects of some local lesion. Under the former circumstances it appears that the annihilating shock takes place either in the cold or hot stages, or during the intermission. Sydenham speaks of it as occurring most usually in the cold stage, when he terms it "death by paralysis." In the quartan type of ague it certainly does frequently happen during the cold fit; not so, however, in the others, which constitute the larger number of cases: in these it most usually takes place during the hot stage, or, according to Dr. Davis, in the period of intermission

Anatomical characters. The morbid appearances most frequently met with in patients dying during the course of intermittent fever are, inflammation of the serous membrane and substance of the brain, and disease of the liver, spleen, and stomach. From the dissections published by Bailly (*Traité Anatomico-Pathologique des Fièvres Intermittentes simples et pernicieuses*) it appears that, in nearly all he examined, the previous existence of inflammation of the arachnoid was indicated by the most vivid injection; in some cases it was evidently thickened, and as if doubled by a sanguinolent false membrane. In many instances on cutting into the cortical part of the brain, the divided surfaces presented an undue vascularity, being immediately covered with an infinite number of small drops of blood. In some cases the colour of the

cineritious matter is deeper than natural, even approaching to a dark reddish grey; red spots are very frequent, and occasionally softening has been observed. The vessels of the brain generally are often distended and gorged with blood, the lyra especially being fully injected. Serous effusion is frequent among the convolutions of the brain; and at times, though more rarely, it is found in the ventricles.

The lungs are generally healthy; they have however, in some few cases, been seen gorged with blood. The heart has also been found distended and flaccid.

The liver is a frequent seat of lesion. Dr. Davis says, dissection has shown that the organs primarily affected are the liver and the spleen. In subjects who have expired of this disease, even in its early stage, these viscera have always appeared to be materially altered in their structure. (*Op. cit.*) The liver has been found enlarged even to a very great size. Grottonelle relates a case, where it had increased to such an extent as completely to mask the stomach and intestines, the left portion extending into the hypochondrium of that side, and adhering to the spleen, so that it could not be separated without being torn. The structure of this immense mass appeared to be, nevertheless, perfectly normal. (*Ad acutas et chronicas Splenitidis eidemque succedentium morborum Historias Animadversiones.*) Sometimes the density of its structure is increased, sometimes it is diminished; it is generally found gorged with blood, thus presenting a purple or deep black appearance. Bailly speaks of having met with it presenting a character as if composed only of black blood slightly coagulated, and of cellular bands, which alone offered some resistance to the pressure of the finger. Where this weak resistance was overcome, the liver was but of the consistence of thin jelly; for the blood appeared effused in its tissue, which resembled a pulpy mass, in no way identical with its natural parenchymatous structure. In another case mentioned by this physician, the liver was putrid and tubercular. This lesion commenced towards the convex part, and extending itself on all sides, descended towards its concavity; nevertheless, the greatest destruction of texture was on the convexity, the remaining portion being engorged and inflamed. Its volume was natural. Occasionally purulent deposit has been found in the hepatic structure. The hepatic ducts are often found injected, thickened, and distended with a dense, dark-coloured, viscid bile, as is likewise the gall bladder, the inner surface of which is occasionally inflamed and ulcerated.

But of all the lesions which are met with in fatal cases of intermittent fever those of the spleen are most frequent. This organ appears to be singularly often affected: its most usual character is increase of bulk and consistence; its structure is easily torn, its interior being found to be broken down and composed of a blackish-red pulpy mass: sometimes it is of a grey colour. Morgagni mentions a case in which the spleen weighed eight pounds; and another is related by Bailly, in which it weighed nearly ten, the structure being entirely converted into a pulp. The spleen has been occasionally found ruptured by a longitudinal fissure, and the broken down and altered tissue in the cavity of the abdomen. In one case there were fifteen or sixteen ounces of dark blood, resembling oil, among the intestines. In this case the spleen was ruptured at its inferior part by an opening, the size of a dollar, from which issued a dark putriform substance: it was impossible to raise the spleen without breaking it; and it was so diffluent that it separated into two portions, one of which, when placed on the table, became flattened like jelly, the other remained attached to the diaphragm, which it was necessary to cut out in order to expose the spleen completely. In volume it was not much increased.

When rupture of the spleen takes place the grumous blood is found in the cavity of the abdomen, sometimes unmixed, at other times it is diluted by a sanious bloody effusion, evidently the effect of serous inflammation. Dr. Davis speaks of suppuration and ulceration of the spleen, but does not think that, unless these lesions have become established, or that in weight this organ amounts

to from two to five pounds, they prove the source of much secondary disease; nor does he imagine that this or any other lesion is ever the cause of the primary fever. When lesion of the spleen is met with in other organs, generally the spleen and pancreas have almost invariably undergone some change in structure. The pancreas is often hardened, so as almost to resemble schirrus.

The stomach, especially the pyloric orifice and great curvature, is a frequent seat of inflammation, the characteristic appearances varying according to its intensity and duration. Similar inflammatory appearances are occasionally observed in the intestines, but more particularly in the duodenum. Intestinal ulcerations are rarely seen unless dysentery have accompanied the fever.

According to the observations of Morgagni, Sydenham, Pringle, Bailly, Fellows, Chisholm, and Cleghorn, such are the appearances observed on dissection in fatal cases of intermittent fever. The last mentioned writer sums up the question by saying, "I have examined the bodies of nearly a hundred persons who perished in these fevers, and constantly found one or other of the adipose parts in the lower belly (the cawl, mesentery, colon, &c.) of a dark black complexion or totally corrupted; the *vesica fellea* full and turgid, and the stomach and intestines overflowing with bilious matter; the spleen larger, sometimes weighing four or five pounds, and so excessively soft and rotten, that it had more the appearance of coagulated blood wrapt up in a membrane, than of an organical part. In the cavity of the head and breast nothing extraordinary was met with, excepting yellow serum when the skin was tinged with the same colour."

M. Bailly gives the following numerical statement of the different lesions. He found in 33 cases more or less extensive disease in the brain, in 22 of these there was thickening and other marks of inflammation of the arachnoid coat, and in 11 inflammation of the substance of the brain. In 20 cases there was gastro-enteritis, in 4 gastritis, and in 4 enteritis uncomplicated with gastritis. In 11 the spleen was softened; in some instances it was enlarged, one weighing from two to three pounds, and another from eight to ten pounds; in 2 cases the spleen was enlarged, and hardened; in 3 it was ruptured, and in 1 gorged with blood. In 2 instances the liver was softened, in 4 it was gorged with blood, and in 1 inflamed. In 2 cases there was pericarditis, in 3 peritonitis, in 1 there was pneumonia, and in another inflammation and enlargement of the parotid.

Statistics. As writers on intermittent fever have not generally devoted much attention to the statistics of intermittent fever, we are unable, from the very few available materials, to present a very satisfactory sketch of them. Few however as they are, they are interesting.

All ages appear subject to this type of fever, though some periods of life are more prone to it than others. In infancy it is a very rare disease. Schenck relates a case which he terms congenital, in which the paroxysm of an intermittent appeared immediately after birth; and Paullini details another, in which it appeared in very early infancy. (*Obs.*, lib. vi. n. 36.) And Lind, when showing the analogy between the intermittents of England and hot climates, says, that even infants at the breast are not exempted from it. (*Diseases of Hot Climates.*)

The type of ague appears greatly to depend upon age. The quotidian occurs most frequently in early life or in advanced age, while the tertian is rather a disease of adult life, and the quartan of adults and the aged. Andral has given the following table, showing the ages at which fifty-six cases of intermittent fever occurred, under the care of Lerminier, in the Hôpital de la Ch·rité. Of 4 patients, at the age of 15, 3 were cases of quotidian or double tertia and 1 of quartan; of 5, between the ages of 16 and 20, 4 were cases of quotidia. or double tertian, and 1 of tertian; of 19 between the ages of 20 and 25, 10 were cases of quotidian or double tertian, 5 of tertian, 2 of quartan, and 2 of erratic ague; of 14, between the ages of 25 and 30, 6 were cases of quotidian, 5

of tertian, and 3 of quartan ; of 6, between the ages of 30 and 35, 3 were cases of quotidian or double tertian, 2 of tertian, and 1 of quartan ; between the ages of 35 and 45, there was 1 case of quartan; of 3, between the ages of 45 and 50, 2 were cases of tertian and 1 of quartan ; between the ages of 50 and 55 there was 1 case of tertian ; between the ages of 55 and 60 there was 1 case of quotidian; at the age of 61 there was 1 case of quotidian ; and 1 of tertian at the age of 68. On comparing this with other statements given by Andral as to the frequency of simple fever, it appears that both classes are most common between the ages of 20 and 25; that continued fever occurs most frequently between 15 and 20, but very seldom between 25 and 30, which is exactly the reverse of what takes place in intermittent fever. Martinet says, at first sight it may appear strange, that persons from 20 to 25 years of age should be so susceptible of these diseases. An adequate explanation of the fact however is given, as a majority of these cases consisted of young persons who had come from the country to seek employment in Paris, and were exposed to privations, disappointment, fatigue, and unwholesome food, the usual predisposing causes of fever.

Sex appears to have no other influence than is to be accounted for by the difference in modes of life. The quotidian occurs more frequently in women of inactive habits, than in men. Sir George Baker, in his account of the epidemic in the fens of Lincolnshire in 1780-1, mentions, as worthy of notice, that in many families, the female servants were nearly exempt from the tertian intermittent, while very few male servants, especially the labourers in the open fields, escaped.

The constitutional temperament appears to influence very much the type of the disease ; the quotidian most usually occurs in those of a languid and delicate habit, and in whom the fibre is lax and but little irritable ; the tertian is most frequent in the robust and sanguine, and in those who are liable to derangements of the alimentary function ; while the quartan occurs in those of phlegmatic constitution, in the melancholic, in those whose health is impaired by study or intemperance, and in persons subject to hæmorrhoidal discharges.

Of the influence of particular occupations little can be said, excepting that it is very evident, that those who are working in or near the marshes, whence arise the peculiar miasms, are particularly prone to the disease.

Climate appears to exert a very notable influence in warm latitudes, where observation has amply proved that this class of fevers is more fatal than in the temperate and cold. In the former they are apt to destroy by the violence of the symptoms during the paroxysm ; in the latter they put an end to life by their obstinacy and continuance, and by the visceral disease and debility which they induce ; situation also affects both the type and character of ague. It is particularly a disease of moist situations, a continued residence in which frequently converts a tertian into a double tertian or quotidian. Sir John Pringle says, that ague is ever more regular in those situations where the moisture is pure and unmixed with exhalations issuing from organic matter in a state of elementary decomposition. It is not a little singular, however, that during the years 1800—1802, when intermittent fever so much prevailed in England, while the inhabitants of the high grounds were harassed by this fever in its worst forms, those of the subjacent valleys were not affected by it. Sir George Baker and Sir Gilbert Blane noticed particularly that the people of Boston, and of the neighbouring fens, were in general healthy at a time when this fever was epidemic in the more elevated situations of Lincolnshire. (*Select Dissertations.*)

Season exerts a most undoubted influence, so much so, indeed, that some writers, more especially Sydenham, have been induced to found upon the effects it produces a system of classification—hence the origin of the terms vernal and autumnal agues. In no known country, where intermittent fever prevails, has this influence been found wanting. Agues are never found to be

equally prevalent at all periods of the year. In temperate climates the order which they follow may be stated as follows:—A comparative freedom from disease is enjoyed between the winter and spring quarters; shortly after the spring season has commenced, agues make their appearance, and continue to increase until immediately after the summer solstice, when there is a short period marked by a most decided decrease of disease, followed immediately by more numerous and severe cases, which continue during the autumnal equinox, but subside towards winter. The quotidian is most prevalent about the end of winter and during the spring; so very generally is this the case, that Sydenham says he never saw a genuine quotidian in autumn, and doubts whether it ever occurs excepting at the spring time. The tertian occurs at all seasons of the year, but it is most frequently observed to prevail in the months a little after the summer solstice until the winter has fairly set in. In the depth of winter their frequency is very much diminished; to a certain extent they again occur towards the spring, and again subside as summer advances. Intermittents occurring at this latter season are comparatively mild, while the autumnal disease is often obstinate, and gives rise to serious results. The quartan ague may almost be termed an autumnal disease, almost universally occurring betwen the equinox and winter solstice. It is rarely or never met with as a vernal disease, unless it have been a latent autumnal ague, or is consequent upon relapse. Amongst those who suffered from this disease during the Walcheren expedition, in the advanced stages the influence of the weather was remarkable. (Davis, *op. cit.*) In the beginning of October, when the weather was fine and dry, no modification of the disease arose from the complication of accidental complaints with it. The disease advanced, and its consequences succeeded in a certain order, its fatality depending upon its own force, and the extensive mischief it produced in the viscera. In November many inflammatory affections of the lungs and bowels occurred, and sometimes rheumatism; during the height of which the paroxysms of ague were suspended, but recurred when those diseases abated. The intermittent, for a time, gave place to continued pyrexia, which in its turn was carried off by an accession of ague. As in the preceding month the intermittent offered varieties in its appearance, depending upon its own character and not upon any modification from the weather. At the latter end of November, and the beginning of December, accidental combinations were less frequent; still there were some inflammatory affections of the throat and chest, which now and then became difficult to manage.

Of the 56 cases given by Andral there occurred in January, February, and March, 9 (3 quotidians or double tertians, 5 tertians, and 1 quartan); in April, May, and June, 10 (1 quotidian or double tertian, 5 tertians, 3 quartans, and 1 erratic); in July, August, and September, 17 (10 quotidians or double tertians, 6 tertians, and 1 quartan); and in October, November, and December, 20 (14 quotidians or double tertians, 3 tertians, 2 quartans, and 1 erratic).

Bailly asserts that intermittent fever is entirely confined to the human species—the lower animals never suffer from it. In situations where the influences producing this disease prevail, animals in common with man suffer; but the morbid phenomena never assume in them the character of an ague—the fever being invariably a continued one.

Nature. The nature of intermittent fever is very obscure. The inquiry naturally resolves itself into the consideration of, 1. The proximate cause of the paroxysm; and, 2. The laws which govern its periodical recurrence. With regard to the former, various theories have been formed. Some writers consider that intermittent fevers depend on local inflammation of an intermitting character; Broussais ascribes them to inflammation of the mucous membrane of the digestive canal; Mongellaz and Boisseau to inflammatory irritation of any of the abdominal organs. To these views it may be objected, that the symptoms are not referrible to the usual laws of local inflammation, as regards its fixity; and that, in fatal cases, the effects of inflammation are not discoverable by dissection. There can be no doubt that, during the

paroxysm of ague, congestion takes place; but this is not only not identical with inflammation, but an effect and not a cause of the paroxysm.

Again, it has been supposed that the phenomena are produced by the influence of the specific causes on some portion (according to Hildenbrand, the ganglio-splanchnic) of the nervous system.

Some have assumed that intermittents, in common with other forms of fever, depend on congestion of the capillary system. It is probable that the structural changes which take place in the several organs are immediately owing to this cause; and that, during the progress of the fever, these vessels are incapable of performing their functions; but it by no means follows, that the action of the primary febrific cause is exerted in this system; and that, if it be involved at all, it is only secondarily. As the investigation, however, is intimately connected with that of the proximate cause of fever in general, we forbear going more at length into this obscure subject.

It would be useless to enter into any discussion on the various vague theories which have been proposed with the view of explaining the cause of the intermittence of agues. It is much to be regretted, that no satisfactory explanation of phenomena so remarkable has been given. It therefore appears that the nature of intermittents, as well as the laws which govern their periodicity or intermittence, are involved in the greatest obscurity.

Exciting causes. It has been proved by evidence the most complete, that, excepting on very rare occasions, intermittent fever is caused by a morbific agent, which has been termed marsh miasm, or paludal exhalation. Many attempts have been made to arrive at a knowledge of the physical qualities of this agent. Moschati and Broschi examined the atmosphere — the former of some very insalubrious rice-fields, the latter of an unhealthy spot in the papal states; from which it appeared that it contained albuminous flocculi, somewhat viscid in appearance, but the nature of which was not understood; and that it possesses a certain weight, as it does not appear to rise in the atmosphere, unless mingled with it by currents of air. All that is valuable on the constitution of the atmosphere of those places where ague is prevalent, may be summed up from the results of the extensive investigations made by M. Julia: — 1. That the air of these several situations contains the same principles, and in the same proportions, as the purest air of the most healthy situations. 2. Marsh air contains a principle which eludes the test of the most delicate chemical reagents. 3. Though the nature of the noxious vapour is unknown, there is reason to believe that its pernicious effects depend on a form of vegetable and animal substance in a state of decay or on a solution of these substances in air, or on the gases resulting from their decomposition. 4. Experiment has not yet demonstrated in marsh air the existence of azotic gas, carburetted hydrogen, or ammoniacal gas, or any of the gaseous products of decomposition; and if they are present in this vapour, their quantity is too small to be appreciated. Whatever its constitution or essence may be, it at any rate appears evident, that in order to its production there must be present a certain quantity of moisture, vegetable or animal matter in a partial state of decomposition, and a degree of temperature which may not be termed cold; for we see that it prevails in districts where such conditions obtain, — in the extended estuaries of rivers, in swamps which pass, under the exhaling influence of the sun, into a comparative state of dryness, on the banks of rivers subject to floodings, and on low flat sea-shores.

It also appears evident, that the influence of the infected atmosphere varies in intensity according to its distance from the source of miasm. Thus we are often enabled in the vicinity of marshes to trace the various grades of miasmatic fevers, from the most violent and fatal to the most simple and mild varieties, as we progressively remove from the focus of the deleterious exhalations to the circumference of its influence. It is for a like reason, viz. the intensity of the miasm, that on the first appearance of miasmatic disease they are comparatively slight; while, as the season advances, they become more

severe and fatal, and again gradually diminish as the advance of winter controls the elimination of the specific poison.

It has been observed, that in rare cases other causes are the means of generating fevers of an intermittent type. Richter speaks of its being caused by worms and other sources of intestinal irritation, by suppression of the catamenia and habitual discharges. We have seen a case of true tertian occurring in a girl nine years of age, which was most undeniably referrible to fright. Bailly and Audouard in France, and Cleghorn and Fordyce in our own country, have maintained an opinion, that it is communicable by contact; and Dr. Brown says, that cases have fallen under his observation which have led him to entertain at least a suspicion that such was the fact; and he quotes from Bailly a case which he thinks most forcible:—"A lady arrived in Paris with an intermitting fever, which she had contracted in the country in a marshy situation. Scarcely was she cured, when her husband, who had never quitted Paris, but who had had the imprudence not to keep himself apart from her during her illness, was struck with like symptoms, and in a manner altogether similar.

Treatment. Before detailing the measures to be adopted in the treatment of intermittent fever, it is proper to point out the great importance of removing the patient, if practicable, from the situation whence the malarious poison has been derived. The difficulty of curing ague when the patient is obliged to remain in a malarious district, and the comparative ease with which the symptoms are often removed in a pure air, render it expedient to adopt at once this important measure.

The treatment is divided into that, 1. Of the paroxysm; 2. Of the interval; and, 3. Of the effects, or *sequelæ*, of the disease.

During the paroxysm the utility of assisting nature, and of counteracting morbid action, is plainly indicated. The natural efforts are to be assisted in superinducing upon the cold stage a quick reaction or the hot stage, and afterwards in converting the hot into the sweating stage. The morbid actions to be guarded against are, the congestive, inflammatory, and weakening effects, which have been detailed above.

1. In the cold stage warm diluent drinks are to be freely exhibited, while the application of warmth to the external surface is to be assiduously employed by means of warm clothing, bladders filled with hot water, and similar means. Various internal remedies are to be administered at the same time. An opiate given a little before the accession of the cold stage, or during its continuance, has been found most serviceable; it controls the convulsive shaking, quiets the pain, and relieves the mind from the peculiar irritability which characterises this stage. The combination of an antimonial with the opiate has been found to assist its operation. The exhibition of an emetic on the first feeling of languor, followed by copious draughts of the warm infusion of chamomile, pennyroyal water, or balm tea, has been much recommended; and there can be no doubt that this treatment is generally followed by satisfactory results.

The practice of bloodletting during the cold stage has been strongly advocated in recent years, more especially by the late Dr. Macintosh of Edinburgh. In those cases where it has been employed, there can be no doubt that it cuts short the paroxysm; but, take it in all its bearings, it is not a mode of treatment to be recommended. The consequences of its employment may be thus estimated: that, though favourable as far as the individual paroxysm in which it is employed is concerned, it is injurious as regards the whole disease. Dr. W. Stokes, after patiently and fairly examining the subject, states, that he apprehends an impression will be received, certainly against the indiscriminate or even frequent use of bleeding in the cold stage of ague.

The late Dr. Kellie of Leith made a curious suggestion. From certain facts which are detailed in the *Medical Commentaries* for 1794, he thought himself warranted in concluding, 1. That, at any time during the cold fit of an inter-

mittent, if tourniquets be so applied as to obstruct the circulation in two of the extremities, in three minutes thereafter the hot stage will be induced. 2. That if tourniquets be applied previous to the accession of the paroxysm, the cold stage will be entirely prevented. 3. That where the cold stage of an ague is either thus shortened, or altogether prevented, the following hot stage is rendered both milder and shorter in duration. The compression ought generally to be continued ten or fifteen minutes, for the symptoms of the hot stage will thus be moderated: but it ought seldom to be continued much longer, as Dr. Kellie observed that, when this has been done, the pulse which had become fuller, stronger, and slower, became smaller and more frequent; and, when the tourniquets were removed, the rigors and successions returned.

2. On the approach and during the continuance of the *hot* stage, the clothing should be light, the room ventilated, and the surface of the body, or rather the arms and legs, frequently sponged with cold water. To allay the intense thirst a plentiful supply of cold acidulous drinks should be allowed. Opium has been much recommended in this as well as in the cold stage. Dr. Lind (*Diseases of Hot Climates*), to whom the profession is chiefly indebted for the knowledge of its specific action, was induced, after watching its beneficial effects when given at other periods of ague, to administer it to twelve patients in the hot stage, eleven of whom were immediately relieved from headach, the fever gradually abated, and a profuse sweat broke out: this alleviation of the symptoms was soon followed by a perfect intermission. He afterwards prescribed it with very beneficial results to upwards of 300 persons labouring under intermittent fever, the quantity usually administered being fifteen drops of laudanum combined with two drachms of the syrup of poppies.

There are certain cases in which bloodletting, or the application of leeches, are required in the hot stage, though much judgment is necessary before they are resorted to. Should severe local pain, or other symptoms supervene, pointing out the probability of organic lesion becoming established, abstraction of blood should not be omitted. It must not, however, be employed late in the disease to any great extent, otherwise the constitution will be impaired and the strength depressed — circumstances at all times to be dreaded in these fevers. Epispastics as derivative applications under such circumstances are only objectionable from occasionally increasing the irritation under which the patient labours.

3. When the hot stage has subsided into a free perspiration, the only thing to be done is to encourage the cutaneous discharge by tepid drinks until all uneasiness has subsided. As soon as this takes place, quiet means should be adopted to check it, for if it continue for any length of time, it tends much to weaken the patient; this is most judiciously effected by dry rubbing, and replacing the wet with dry clothing.

We have hitherto been considering the treatment of *simple* or uncomplicated intermittents, from the history of which Dr. Craigie has well-observed, three points may be allowed to be safely established. 1. That some agues admit of spontaneous cure; 2. That if paroxysms are prevented from recurring, the disease is more likely to disappear than if they are allowed to recur; and, 3. That if permanent congestion or inflammation of organs are prevented from taking place, the disease is much more curable than when they do ensue.

4. In the *inflammatory* forms, a more active plan of treatment is required. Bloodletting, when the patient is young and plethoric, and moderate purging, are generally necessary; and should local inflammations arise in the head, chest, or abdomen, both general and local depletion, with such other measures as the circumstances of each case may indicate. Though the bloodletting may be performed with safety and advantage in the hot stage, when the violence of reaction is liable to increase the local inflammation, most practitioners advise that it should be deferred until the interval, unless the symptoms are such, that danger might be incurred by the delay. In short, the same principles of treatment which experience has shown to be best suited to the local

lesions that occur in continued fever, are applicable to those of intermittent, regard being had to the state of the vital powers, the type of the disease, and the intensity of the local affection.

The *gastric* complication, though seldom dangerous, is perhaps the most difficult to manage. It requires the occasional application of leeches to the region of the stomach or to the abdomen, followed by mild aperients, such as rhubarb and tartrate of potash, magnesia, or castor oil. If the stomach continue irritable, and the sickness and vomiting urgent, sinapisms should be applied to the epigastrium, and large draughts of thin barley-water, and afterwards the saline effervescing mixture, or soda-water, administered. If necessary, the bowels may be relieved by occasional enemata. If the vomiting persist after these measures, opium, combined with aromatics, will generally allay it.

When ague is complicated with *dysenteric* symptoms, should the tormina and bloody or slimy stools resist the exhibition of opiates alternated with mild aperients, it will be proper, if the state of the pulse require it, to take blood from the arm, or to apply leeches to the abdomen, and afterwards warm fomentations, or the warm or vapour bath may be employed. A full dose of opium and James's powder may afterwards be given. Dr. Craigie recommends charcoal in doses of ten to twenty grains, five or six times a day if the stomach will bear it, as the most effectual remedy in agues with gastro-enteric disorder.

In the *malignant* forms of ague, twenty-five or thirty drops of laudanum should be given in hot spiced negus at the beginning of the cold stage, and afterwards hot drinks to bring on reaction. In the hot stage, diaphoretics and antispasmodics are to be employed. The warm bath, or what has been found more serviceable, the vapour bath, should be employed; should the patient be too weak to undergo the fatigue of either, the hot air bath may be substituted. The sweating stage should be promoted by opium combined with antimony in warm negus, according to the state of the vital powers. The combination of camphor and ammonia is often very efficacious when there is great debility. When local complications arise in this form of ague, topical depletion, if the strength will bear it, or, if not, the application of blisters or sinapisms to the region of the part affected, must be resorted to, while the strength is supported by nourishment and cordials.

5. During the intermission the most strenuous exertions to prevent the recurrence of the paroxysm are to be made. The treatment recommended as applicable to the paroxysm is essentially palliative, while that of the intermission is curative. Experience has very fully assured us of the specific effects of certain medicines; but we are totally ignorant of their modus operandi. The first thing necessary to be done, is to ascertain if there be coexisting organic disease, as such complications materially alter the means to be resorted to. In simple ague the bowels are to be thoroughly emptied; and as the secretions of the liver are generally deranged, four or six grains of calomel followed by a purging draught should be given, and repeated occasionally, until the alvine secretions and the state of the tongue give assurance of the desired effect being attained. In this country calomel is rarely administered as an antiperiodic; in India however, according to Mr. Annesley (*Sketches of Diseases of India*), large doses, to the extent of twenty grains, are administered with the effect of almost immediately suspending the ague. We are not, however, inclined to rank it amongst the medicines proper to be administered as an antiperiodic; for, independently of its violent and weakening effects upon the system, it is almost invariably found, that, on withholding its administration, the disease returns. Where the ague is simple, or not materially complicated by organic lesion, after the primæ viæ have been well-evacuated, those medicines which are so essential to the cure of agues, and are known by the name of antiperiodics, are to be administered. We shall now proceed to mention some of the more important: —

The exhibition of emetics is frequently of very signal service; administered about three hours before the expected period of attack, it invariably mitigates,

and sometimes entirely supersedes, the paroxysm. Pringle however says, that ipecacuan alone is not adequate to produce this effect; and that it is necessary to combine with it one or two grains of the tartar emetic.

Fowler's mineral solution (the Liquor Arsenicalis of the Pharmacopœia) has long been in estimation from its power of arresting this as well as other periodic diseases. In the fenny districts of England its specific effects are well-known; it is there constantly used under the empirical name of *Tasteless Ague Drop*. This medicine, administered in the doses of five or six drops, every four or five hours during the intermission, often puts a stop to ague. It may very frequently be employed, when quinine and other preparations of cinchona disagree. Dr. Brown says, that an extensive experience leads him to give it a general preference over crude bark, but he thinks it inferior to quinine, though, under certain circumstances, it may supply its place; moreover, it may be given in a more inflammatory state of the system than is compatible with the safe administration of quinine. It has also been found that when an individual, who has been cured of ague by the sulphate of quinine, or any preparation of bark, suffers a relapse, the same medicine proves inadequate to restore him to health: under such circumstances arsenic will very generally effect the cure.

Sulphate of zinc has been administered by many practitioners with the most beneficial results. The usual dose is four or five grains in the form of a pill, every four or six hours. Sir James Macgrigor gave it to the soldiers in the Peninsular to the extent of half a drachm daily. Dr. Hendy, while residing at Barbadoes, employed the white oxide; and he states, that in doses from two to five grains, every six or eight hours, it removed agues which had resisted bark and other remedies.

The Artemisia Absinthium (salt of wormwood), in doses varying from one scruple to two drachms, has according to M. Muys been administered with very salutary results. It was given before the paroxysm, or immediately on its accession. From the experience which this practitioner had of the effects of this remedy, he concludes that it ought to be regarded as at least equal, if not superior, to bark.

The acetate and citrate of ammonia have also been employed, but with various success. Such has also been the result of trials of the salts of iron, and the whole range of bitter astringent woods. To enter upon a discussion of this class of medicines would be tedious and unprofitable. We shall therefore mention one only, the Peruvian bark, the effects of which upon intermittent fever have been marked by the most satisfactory results. As much of its efficacy appears to depend upon the quantity administered, it has always been an object to devise such means and such combinations as render it most grateful to the stomach. It may be administered in the forms of decoction, tincture, extract, or powder; the latter appears generally to have been preferred in doses of from ten grains to two drachms. The mass thus swallowed has, however, generally proved very embarrassing, not only from the quantity of woody indigestible fibre thus thrown into the stomach, but from its occasional nauseating effects. To the credit of modern science, these difficulties have been surmounted: in the sulphate of quinine we possess all that is curative in this remedy. This most elegant preparation is safe and powerful in its effects; administered to the extent of three to five grains every two, three, or four hours during the intermission, it rarely fails soon to arrest the progress of the fever. Some physicians have administered it to the extent of twenty grains at a dose, and have by this means succeeded in putting an immediate stop to the disease. In some persons quinine produces uneasy sensations in the stomach; this effect, however, is speedily counteracted by the addition of a few drops of tincture of opium.

The salt of the willow bark (*Salicine*) has lately attracted attention. In its effects it appears very nearly allied to the quinine, and though not equally efficacious, may yet be regarded as a very valuable substitute for it.

In the inflammatory forms of ague, and when there exist acute local inflammations, bloodletting should always precede the exhibition of quinine or other remedies of this class; and, as a general rule, the state of the internal organs should be carefully watched during the disease, that suitable measures may be adopted, as those local derangements materially interfere with the due effects of the medicines employed with the view of preventing the return of the fit. In all cases of protracted ague in which the intermissions are generally imperfect, it is probable that disease in some important organ, generally the liver or spleen, has taken place, which should either be removed or alleviated before the antiperiodic remedies are resorted to.

The treatment of the *sequelæ*, or effects of ague, is in general very unsatisfactory, as structural changes in the organs previously affected have generally taken place. Hence the practitioner has often to contend with enlargements of the liver and spleen, and the consequent dropsical effusions, or chronic diarrhœa, or dysentery.

In the consecutive hepatic disease, occasional local depletion, followed by blisters or setons, and mercurialisation, and afterwards the mineral acids, may be cautiously tried. A course of the Cheltenham waters may be useful in recruiting the shattered constitution.

In cases of enlargement of the spleen, depletions and mercurials are useless, if not injurious. More benefit will be derived by a combination of quinine and sulphate of iron perseveringly employed. The hydriodate of potash in small doses has been recommended, but its utility is very doubtful.

The removal of the consecutive dropsical effusions must depend on the probability of the organic lesions on which they depend being curable: if they are not, we must attempt the palliative treatment by diuretics combined with mercurials.

We have already alluded to the treatment of agues complicated with diarrhœa and dysentery, to which we have nothing to add here. In all cases the convalescence, and especially the diet, should be carefully regulated. The importance of suitable clothing in such cases should not be overlooked.

REMITTENT FEVER.

Nomenclature. — Symptoms which characterise the simple form. — Varieties. — Bilio-inflammatory. — Inflammatory. — Malignant. — Complications. — Terminations. — Anatomical characters. — Diagnosis. — Duration. — Prognosis. — Nature. — Treatment.

FEW diseases have acquired so many different names as this form of fever. It has been called by the name of almost every country in which it occurs endemically: thus we have the *Mediterranean*, the *Walcheren*, the *Hungarian* fever, &c.; so that, without comparing the descriptions of these, we might be induced to believe, that instead of one form of disease there existed many. This has led to so much confusion, that it often becomes a source of great difficulty clearly to understand the nature of the disease which the respective authors are describing. As it is obviously most unscientific to designate diseases from the localities where they occur, and is moreover very apt to mislead, we shall endeavour, under the term *Remittent Fever*, to give a succinct description of the various forms which this disease assumes, premising that it appears from the numerous accounts which have been published, to take

on in different situations and in different seasons very dissimilar characters. These, however, may be referred to one of three forms — 1. The Simple; 2 The Inflammatory; and, 3. The Malignant.

Remittent fever may be defined to be a disease attended by distinct paroxysms of fever alternating with remissions, one paroxysm usually taking place every twenty-four hours; or it may be stated as a variety of continued fever, characterised by very evident and distinct exacerbations — in the one respect bearing affinity to intermittent, and in the other to continued fever. If we regard, however, its origin, its associations, and organic lesions, it is evidently more nearly allied to the former than to the latter. In many respects intermittent and remittent fevers present great general resemblances. They are evidently produced by the same causes, and have a tendency to assume the characters of each other; while the very marked differences in the accession, duration, and symptoms of the paroxysms, together with the very opposite nature of the intervening periods, evidently point them out not to be one and the same disease.

Remittent fever occasionally develops itself without premonitory signs; more usually, however, its attack is preceded by a few days' ailment, or by symptoms not greatly differing from those described as attendant on the forming stage of intermitting fever. The more usual symptoms which precede the attack are, a general sensation of weight, followed by languor and lassitude of the whole system, sighing and yawning anxiety about the præcordia, with aching pains in the head, back, and extremities; the face is pale, the countenance dejected, creeping sensations of cold are succeeded by flushes of heat, the appetite fails, the bowels are inactive, and the fæces contain a large admixture of bile, the tongue is coated, the taste in the mouth is unpleasant and metallic, the skin is sallow, the eyes become heavy, the brow clouded, and sleep disturbed by alarming dreams. According to Dr. Stevens (*On the Blood*, p. 217.), there is a morbid action in the vascular system, the blood itself being diseased; which deranged state of the vital current is not the effect of either a local disease or a nervous impression, but is produced by the direct action of a specific poison on the living body, the consequences of which are, that the pulse is less frequent than in health, the temperature of the blood, and of course of the whole body, is reduced sometimes so low as 94°. These premonitory signs increase in intensity until the attack of the disease is established; the symptoms of which are considerable aggravation in the pains of the back and extremities, at times to such an extent as to resemble those of acute rheumatism: after a general sensation of coldness, rarely amounting to a rigor, there comes on intense heat together with tenderness of the epigastrium and right hypochondrium, the surface of the body generally being above the usual standard and dry; the countenance is flushed and excited in its expression; the eye, slightly tinged, has a restless and wild expression; the head is distracted with throbbing pains, and in some cases there is wandering delirium; the pulse is frequent, sometimes small and irregular, at other times full and forcible, but rarely hard or tense; the mouth and throat are dry and clammy; the tongue furred, white, and sometimes brown; the respiration is hurried, oppressed, and anxious; thirst is considerable but not urgent; for the most part there is nausea, which is often attended by watery or bilious vomiting; the bowels are generally torpid, but if acted on, the discharges are either black or green, and exceedingly offensive; the urine is scanty and tinged with bile. These symptoms usually continue with varying intensity for some hours, ranging from five to ten, and closely represent the hot stage of a febrile paroxysm.

The febrile paroxysm is superseded by the breaking out of a gentle perspiration on the head and shoulders, which sometimes, though rarely, extends over the whole body, together with a general diminution of the heat and febrile symptoms. Nevertheless, there is by no means a state of apyrexia;

there is yet much quickness and irritability about the pulse, with some slight elevation of temperature; and in place of the intense pain of head, sensations of giddiness, tinnitus aurium, lassitude, and tired feelings of the limbs. This state, which is termed the remission, continues usually for about two hours, rarely more than three, when the febrile symptoms recur, and gradually increase until they have acquired their former or even a greater degree of intensity; and, after having continued for a certain period, generally more protracted than that of the first paroxysm, again subside into the remission. In this way the disease proceeds through a regular succession of febrile paroxysms, or rather exacerbations and remissions, until a critical discharge, which most commonly is a profuse perspiration, takes place. This is the commencement of convalescence. According to Dr. Jackson, a favourable termination of this nature is frequently noticed to occur on every seventh day. He has almost invariably observed that the critical perspiration has supervened on the seventh, fourteenth, twenty-first, or twenty-eighth day. Should this series of events not take place, however, the fever becomes more uniform in its course, and assumes a character which is fraught with much danger. When this is the case, it is not infrequent that, after the second paroxysm, the phenomena of the disease become more obscure, and terminate in remissions which are much shortened in duration, and attended by a more marked febrile character than was the case on the first or second remissions — the exacerbation of the fever itself being in every respect more intense and greatly aggravated, in many respects partaking of the symptoms observable in extreme cases of typhus. The surface of the skin assumes a yellow hue, and maintains an excessive temperature, feels dry and harsh, and occasionally covered by a clammy sweat, especially towards the head and shoulders, but which by no means gives relief to the urgency of the symptoms. The countenance is flushed and swollen; the eyes are prominent, glistening, and wild; the whole expression is one of extreme anxiety and distress. The headach is intense; there is frequently delirium, and occasionally, in the paroxysms of pain, the patient emits piercing shrieks. The pulse is very varying, now it is full and bounding, at one time small and feeble, at another quick and sharp. The tongue becomes covered with a yellow viscid mucus; the bowels are tender to the touch, and distended by flatus; the stools are fetid, sometimes passed unconsciously; there is retention of urine, and constant restlessness with watching. As the disease progresses, the state of excitement subsides into stupor and insensibility: the tongue becomes coated with a thick, black, dry fur; the pulse fluttering; the respiration heaving and laborious, with subsultus tendinum; and the patient gradually sinks into a complete and ultimately fatal coma.

Such is the general view of the *simple* remittent fever as it occurs in temperate climates. The exacerbations in their periodical recurrence usually assume a double tertian or quotidian type; the former is stated to be the most frequent; for notwithstanding the exacerbations occur every day, yet it is very evident that they are more severe in their character on the alternate days. Whatever be the type of the remittent, the remission almost invariably occurs towards morning; while, in double tertian, the exacerbation takes place towards noon, and in the quotidian type some hours earlier, usually about nine or ten o'clock. Unless the disease is disposed to terminate favourably, the alternating of the period of remission with the exacerbation is rarely perceptible after the twelfth day. The remissions, to say the least of them, are very obscure. The patient exhibits a continued state of lethargic drowsiness, attended by a torpid condition of the whole body; the bowels refuse to act unless by the aid of powerful medicines, the stools being of a most unhealthy black nature; aphthous ulcerations of the mouth and fauces take place, a state of things which is quickly followed by the typhoid stage of remittent already described.

Sometimes remittent fever makes its first appearance under the form of a regular tertian ague, and is so little distinguishable from it, that doubt may be enter-

tained as to its nature, until after two or three paroxysms are passed over, when the symptoms together with the order of their recurrence sufficiently develop its true character. In fact it is doubtful, whether it may not really be originally a true tertian ague converted under the peculiar circumstances into remittent fever.

The simple form of remittent fever is subject to many variations, according to age, constitution and locality; but as these almost invariably, quickly pass into and assume all the characters of the inflammatory or malignant types of the remittent disease, and of which we shall presently treat, we shall not further allude to them.

One variety however, which occurs to strangers entering a country where remittent fever is endemical, and which Dr. Copland terms the *bilio-inflammatory remittent*, must be noticed here. Pringle (*Diseases of the Army*), when speaking of the diseases which occurred in the cantonments in Dutch Brabant, gives a very full description of this as it occurred there: — The patients were suddenly attacked by ardent fever accompanied with the most intense headach, and generally with delirium. Should this not take place, and they continued sensible, the patients complained of severe pain in the back and loins, intense thirst, burning heat and oppression about the præcordia, nausea, and occasionally, in some cases, severe retchings and vomitings of bile; while in others the bile was discharged by stool, or accompanied by tenesmus and pains in the abdomen. The pulse is described by Mr. Lander to be at first small and not quicker than natural, but to rise after bleeding: this alteration in the pulse Dr. Craigie attributes however to the natural course of the disease. This form of the fever generally remitted from the beginning, upon bleeding and free evacuation of the bowels; but if these measures were omitted, it was apt to take on the continued form, and to assume the typhoid character. In some cases however, though they were speedily and freely bled, yet in an hour after, so great was the cerebral excitement that high delirium ensued; and, after continuing for some hours, subsided on the coming on of a profuse sweat, under which all the other symptoms either abated or vanished. Next day, about the same time, the paroxysm returned, and in six or seven hours ran the same course. In some, the paroxysms were less distinct, the hot fits longer, followed by imperfect sweats, which afforded but slight relief. Sometimes, indeed, the remissions were so imperceptible, that the fever appeared almost continued in its character, while the nearer it approached this last state, the more intractable it became. But when the paroxysms were distinct, with a remission of some hours between them, the patients for the most part did well, however great had been the cerebral excitement during the exacerbation. After the accession of a few paroxysms the strength of the strongest men was so reduced, that they were scarcely able to stand. In those who had been ill about three weeks, and without any well-marked remission, the fever ended occasionally in quotidian paroxysms; but in these cases there were usually gentle sweats, or rather a continued moisture on the skin. In some cases the critical sweats, which generally occurred about the ninth day, were profuse and very offensive, after which the disease took on the form of a regular intermittent. In others, the crisis took place by stool, or by an abundant flow of urine.

Dr. Stedman and Mr. Lander mention as a characteristic of this form of remittent fever, that the delirium was attended by attempts at self-destruction. That some became delirious without any previous complaint, and would have thrown themselves out of the window, or into the water, if not restrained. This phrenzy continued for some hours, when falling into profound sleep they awoke quite sensible but with violent headach. Drs. Brown (*Cyc. of Pract. Med.*), and Jackson (*Sketch of Febrile Diseases*), have paid particular attention to this symptom. The former says, that, instead of the ordinary form of the febrile delirium, in which the mind appears occupied by a crowd of unconnected ideas, and quite abstracted from surrounding objects, it in this case retains all its acuteness of perception and vigour of reasoning; but there is one erroneous impres-

sion so firmly fixed, that no argument can shake it, and that it is frequently of so gloomy a cast, as to impel its victim almost irresistibly to suicide. In cases where it occurs, the intellect is by no means obscured; on the contrary, it is often accompanied by an elevation of the mental faculties: nor is it symptomatic of any peculiarly bad state of the system, nor is it proper to the advanced stages of remittent fever; on the contrary, it is more frequently observed at the very commencement of the disease, when the faculties, both mental and bodily, are as yet but little affected. It is generally observed in those whose minds have been disciplined by education, and have accustomed themselves to the exercise of its faculties: it may therefore be regarded as a morbid exaltation of them, depending on the general excitement to which the system is subjected during the febrile exacerbation. Dr. Brown says that no decided peculiarity has been detected in the symptoms during life, or in the structural changes discoverable after death, to explain the striking discrepancy from the ordinary form of delirium which occurs in these cases. In all of them there has been evident derangement of the digestive canal and its subsidiary viscera; and this derangement, in general so apt to produce mental dispondency, is acting on a sensorium enfeebled and irritated by fever: but the same circumstances exist in other cases, in which there is either no aberration of mind, or in which, if it exist, it assumes the ordinary febrile form. We are therefore compelled to suppose, that some peculiarity of individual constitution cooperates with the disease in engendering this unusual form of delirium; but there is considerable difficulty in discovering in what this individual peculiarity consists. A tendency to actual insanity certainly will not explain it, for delirium has borne this appearance in individuals who have at no other period of their lives manifested any indications of that malady, and the mental illusions always cease on the subsidence of the fever.

The *inflammatory* form of remittent fever in many respects resembles the simple, excepting that there is a general aggravation of the symptoms, especially of those connected with the circulation. This form occasionally shows itself without any previous warning. Sometimes the premonitory symptoms are ushered in by a sudden attack of the most excruciating headach, which, after it subsides, leaves the system weak and overwhelmed with lassitude: in other cases they are much the same as is observed previous to the attack of ordinary fever, viz. pains in the loins, alternate chills and flushings of the surface, &c.

In general the violence of the disease is in proportion to the suddenness and violence of the incursion. (Eberle, *Practice of Physic.*) When the attack comes on gradually, preceded by the usual premonitory symptoms, the disease generally runs its course slowly. When, on the contrary, the invasion is sudden and violent in its progress, we may expect the disease to be rapid and violent in its course. In the milder forms of the inflammatory variety the first paroxysm generally is ushered in by a very distinct cold stage, which never takes place on the succeeding exacerbations. This sensation of chilliness, for it does not amount to a rigor, is succeeded by headach of the most violent character, flushed face, suffused, and wild expression of the eyes. The skin is generally burning, the thirst intense, with loss of appetite, nausea, and strong, full, and quick pulse. After a few paroxysms of this kind, a copious discharge may take place, either by perspiration or by the bowels, which proves critical, and convalescence ensues.

The inflammatory remittents generally, however, present a much more severe and dangerous character, and which they assume, under circumstances favourable to their development, from the very commencement of the attack. When it assumes this severer character, the cold stage is short and by no means severe, it being almost immediately superseded by the febrile accession, which rapidly acquires a great degree of intensity. It is marked by an incessant and most uneasy restlessness, acute throbbing pain of the head, giddiness, excruciating pains in the loins and inferior extremities, short hurried breathing, with feelings of the utmost anxiety. The face is deeply flushed; the eyes

suffused, and of a dull expression; there is sensation of epigastric fullness, weight, and sickness; the appetite is lost; the tongue furred; the bowels constricted; and the urine scanty, high-coloured, and offensive. These symptoms continue with varying intensity for nearly twenty-four hours, when a remission, always very marked, and frequently amounting to a perfect intermission, takes place. This cessation, however, is very deceitful; for, after a very short period, the second paroxysm is ushered in with aggravated severity. The restlessness is much increased, sleep cannot be procured; the surface of the skin is more intensely hot and pungent to the feel, acquiring that peculiar character which has been called *calor mordax;* the pain of the head is most acute, with feeling of constriction, especially over the orbits; the temporal arteries throb violently; the conjunctiva is yellow, and suffused with blood; the eyes are watery and intolerant of light; the pulse is quick and vibrating; the epigastrium oppressed, and more painful on pressure; the thirst is excessive; and the sickness most deadly, the patient being much harassed by the nausea and retchings which are constant; the bowels remain torpid.

Very often, however, a different state of things obtains after the second paroxysm. The symptoms give way to a clammy perspiration, which is succeeded by an exacerbation, which appears to be very much less violent. On this, the third day of the fever, the patient is less restless, nor does he complain so much of thirst, pain, or heat; but the skin is generally dry, though sometimes it is covered by a clammy perspiration; the face is slightly yellow, with transient flushes passing over it, which, instead of being of the bright red colour they were during the preceding exacerbation, have rather a dull livid hue, and the pulse is less tense and softer but still frequent. Dr. Stevens says, that if blood be abstracted the structure of the red globules will be found to be deranged, as is evident from the colouring matter being often detached from them and dissolved in the serum, imparting to this principle of the blood, when it separates from the fibrin, a bright scarlet colour, the colouring matter being so completely dissolved in the serum that it cannot be separated, either by filtration or any other mechanical means. The tongue is covered with a thick tenacious yellowish fur; the taste is either impaired or so depraved that every thing seems bitter. This state is viewed by Irvine (*Observations on Diseases of Sicily*) as representing the intermission of a double tertain. Though it is often critical, the symptoms afterwards assuming a more favourable character, yet it must not lull into security, as this apparent cessation of severity in the febrile accession is often only temporary; for, in severe forms of this variety of the disease, it not unfrequently happens, after this appearance of complete remission, that towards evening an end is put to all anticipation that the disease has subsided, by an exacerbation taking place, in which all the dangerous symptoms are greatly increased. So deceitful, however, is this period, that not infrequently it has been mistaken for a complete intermission, and tonics and stimulants, which have been given with the view of preventing the recurrence of the paroxysm, have but tended to increase the severity of the disease.

Burnett (*On Mediterranean Fever*) has particularly described the succeeding stages of this variety of remittent fever when it assumes an aggravated form. They are marked by a great increase of uneasiness and pain about the epigastric region, especially on pressure, some patients complaining of a burning sensation extending upwards to the throat; there is great restlessness, with oppression about the præcordia; the abdomen is likewise painful, tense, and tympanitic; the pain of the head becomes more intense, attended by wandering or inattention to surrounding objects; occasionally delirium ensues, which, as the disease advances, passes into coma, though the intellect is often to a certain extent retained, so that, on being roused, the patient answers questions rationally, though, if not disturbed, he lies in a semi-stupid listless state. The countenance becomes deeper and more dingy in colour, till it is almost brassy and orange-like; the eye dull and watery, and the conjunctiva of a confirmed yellow; the skin harsh, moist, and clammy, exhaling a disagreeable fetor, and

at first of a bright yellow, but afterwards of a darker hue; the pulse is irregular, sometimes full and tumultuous, at other times it is quiet, small, but generally intermitting; there is incessant vomiting, often of blood, succeeded in some cases by a matter resembling coffee-grounds; the stools are frequent, thin, black, fetid, and sometimes gelatinous-like; and, according to Dr. Craigie, if kept undergo the putrefactive decomposition natural to animal matters. As the disease advances in its progress, the remissions are scarcely perceptible, certainly by no means so commonly distinct as Cleghorn (*Diseases of Minorca*) states them to be. The whole character of the disease rather partakes of that of a continued fever: blood exudes from the gums and fauces, and hæmorrhage to a considerable extent takes place from the nose and bowels; the restlessness is increased; the jactitation in the bed being constant, subsultus tendinum with picking of the bed-clothes ensue; an irksome pain is felt across the pubis, and there is a suppression of urine. In many cases there is complete ischuria renalis, and in some the bladder has been found distended, so as to require the introduction of the catheter; the stools are passed involuntarily; occasionally the parotids inflame and suppurate; petechiæ and vibices occasionally make their appearance; the tongue becomes coated with a black crust; the teeth covered with sordes; the breathing more laborious, the action of the respiratory muscles being very violent; the anxiety extreme; the pulse intermitting, and so weak as to be sometimes scarcely perceptible; and the whole is finally wound up by cold extremities and profuse clammy sweats. Death frequently ensues on the fourth or fifth day, more generally on the sixth, seventh, or eighth, though occasionally life may be protracted beyond that period.

Such are the symptoms which mark the progress of the inflammatory remittent in its more formidable character, or when it has been neglected or ill-treated. It also frequently supervenes on those slighter forms which have been previously described; so that it is always necessary for the practitioner to be on his guard, as the approach of the severer type is often masked and very insidious, and the symptoms often becoming violent and unmanageable, when least expected to be so.

The *malignant* form of remittent fever is usually preceded by peculiar feelings of feebleness and languor, with pains in the loins and head, giddiness, with flushes of heat, alternating with sensations of chilliness, which terminate, not in a shivering fit, but in a general collapse of the vital powers, and an alarming depression of the circulating system. This is quickly followed by a period of reaction, characterised by the most excruciating pain over the eyebrows, and in the head generally, with a peculiar feeling of tightness, as if the skull was firmly girt with a cord; the skin is dry, hot, and harsh; the countenance flushed and of a purple hue, has rather a collapsed and harassed aspect, expressive of pain and anguish; the eyes are injected and ferretty; the tongue is clammy, and coated with a whitish yellow fur, sometimes rough, dry, and brown; the pain of the epigastric region severe, with occasional bilious vomiting; the pulse full and frequent, but is neither hard nor vibrating; and the patient feels oppressed, restless, and desponding. This state continues for about twelve hours, when a remission ensues, though the patient yet remains very ill and uncomfortable. After five or six hours a slight sensation of cold ushers in another paroxysm, in which the symptoms evidently assume a more dangerous character; the headach is most excruciatingly severe, attended by transient delirium, and uncontrolable restlessness and jactitation; the collapsed and anxious expression of countenance is more marked; the pain at the pit of the stomach is burning and urgent, and much increased on pressure; the whole abdomen participates in this painful tenderness; the general expression of the eyes is glassy and sunken, and the conjunctiva is both yellow and suffused with blood; the skin is of a dusky yellow, and its temperature unequal in different parts; in some, as in the præcordial region, head, &c. being intensely hot, while in others it is cold and clammy, while its sensibility is so much diminished that blisters only produce reddening of its surface; the

breathing is short, laborious, and hurried; the tongue is coated with a dry yellow or brown crust; the lips and teeth become thickly covered with sordes; the thirst very intense; there is nausea, with frequent vomiting of matter resembling curds and whey, which is likewise the character of the copious and frequent stools. Another remission ensues like the former, attended by manifest general indisposition and debility, and followed by another exacerbation of the symptoms, in which the collapse of the arterial system is more marked. The disease now assumes a continued form, and in which, as it progresses, the symptoms evince a more dangerous character: the restlessness is unceasing; the headach becomes of a low nervous character; the abdomen tumid and painful on pressure; the solids appear to have lost their tone, and feel generally flaccid; the skin is of a dirty yellow colour, and, as death approaches, acquires a greenish hue, and in place of the usual temperature, is cold, and covered with a clammy exudation, which is particularly fetid and offensive; the vascular reaction is very low and imperfect; the pulse is intermitting, small, rapid, and fluttering; the tongue is dry, and covered with a black fuliginous coat; the teeth and lips are thickly incrusted with a viscid slime; the gums are spongy, a bloody sanies exuding from their surface; aphthous spots appear in the mouth and throat; the evacuations, which in appearance are black and pitchy, are dark and offensive; there is constant vomiting of a dark grumous fluid; the secretion of urine is suppressed or nearly so; delirium, occasionally violent, but for the most part of a low muttering kind, takes place, and is the forerunner of coma, which almost invariably ensues, while the whole frame is shaken by subsultus tendinum; vibices and petechiæ make their appearance; and the morbid state of the fluid is further shown in the bloody discharges which take place from the mucous surfaces of the mouth, nose, and intestinal canal. The patient gradually sinks, unless convulsion, as is not unfrequently the case, puts a sudden termination to the scene.

Dr. Clark (*On Diseases of long Voyages to Hot Climates*) describes a variety of this form, which in some respects is yet more malignant in its characters. It is ushered in by slight shivering, headach, pain and sickness of the stomach, with great præcordial anxiety, and an overwhelming depression of spirits. Sometimes without any notice the patient faints, during which the expression of the countenance is pale and gloomy in the extreme, a character that is somewhat retained after the state of syncope is recovered from, immediately after which a large quantity of bile is vomited. This period of the disease is particularly marked by nervous timidity, which continues during the paroxysm; the pulse is small, feeble, and quiet; and the pain of the stomach and vomiting increase, until the paroxysm has fairly set in; the countenance is flushed and anxious; the eyes are red, and the headach violent; the pulse rises, becomes full and sharp; the mouth is dry; the tongue furred; and the thirst intense; uncontrolable delirium ensues, which subsides on a perspiration breaking out. In the remission which follows, the pulse becomes slower and soft, but the nervous feelings of debility and personal danger remain. This remission continues but for a short time, when another paroxysm ensues, attended by aggravation of all the symptoms: the fever now becomes continued, no trace of intermission being discoverable; the pulse intermits, is small and rapid; the tongue becomes black and crusted; the epigastric pains are excessive; the stools frequent, fluid, and offensive, and voided involuntarily; coma alternates with violent delirium. Tremors, hiccough, vibices, and petechiæ, are prominent symptoms, together with a clammy moisture in the skin, from which exudes a stinking cadaverous smell. After the third or fourth day the patient dies.

In this variety there is, from the first, a strong impression on the patient's mind that the disease will terminate fatally; and this is so firm, that no reasoning can alter it. Dr. Brown (*Cyc. Pract. Med.*) says, he does not know whether this is to be considered as a mental illusion or not, for, in every case

which had fallen under his observation, the patient's prediction had been fulfilled. It is doubtful, whether the mental impression was instrumental in the accomplishment, or whether it did not itself proceed from some deadly feeling of the patient, which language could not express, and of which the cause did not display itself by manifest signs. Dissection has thrown no light upon this point.

Such may be considered the more usual forms in which remittent fever is met with, when uncomplicated by other diseases. There are, certainly, many varieties which occur; but to enter at any length upon them, would occupy more space than our limits will permit.

Complications. It is necessary to keep in view the great liability of this disease to become complicated with organic lesion. This is almost universally the case in the inflammatory and malignant forms. The symptoms which have been detailed as characterising these, show evidently that there is always present much functional disorder of the liver, alimentary canal, and brain; and we find it is in these organs that lesions are most ordinarily met with. As the occurrence of these is one of the chief causes of fatal termination, the importance of being aware of their presence is obvious. At the same time it must be understood, that in describing them we are not alluding to that condition of remittence which so often occurs in acute and febrile diseases. The copious details of the different forms of remitting fever which have been given, render a lengthened detail of its complications unnecessary.

When the mucous surface of the stomach becomes inflamed, independently of the usual heat, pain, and tenderness, being much aggravated, there is a constant craving pain, increased on pressure, and which is continued during the remission. The tongue is covered with a thick yellowish layer of mucus, subsequently becoming brown and cracked, with dry fiery edges. There is general loss of appetite, or rather a disgust of every kind of food. If the alimentary canal participates in the inflammation, and which it usually does, the abdomen generally is painful, distended, and tympanitic; the stools are watery, and resemble in appearance the washings of flesh; the urine is turbid and yellow. The dysenteric symptoms which show themselves so often in the advanced cases may be referred to this cause.

When the structure of the liver participates in the mischief, there is severe pain and tenderness of the right hypochondrium, with a pulsation there and on the epigastrium, which Mr. Cartwright describes as equal to that which the heart produces in the thorax, and synchronous with the pulsations of that organ. There is also excessive irritability and spasm of the stomach; the febrile heat is intense; at first the tongue is clean, but afterwards it becomes coated with a brown fur; there is great torpor of the bowels, incessant sickness and vomiting, at first of a very small quantity of glairy fluid, without admixture of bile, but subsequently of a dark grumous fluid, which is likewise the character of the frequent copious motions which supervene on the previous state of costiveness.

When the brain or its membranes are affected, the excitement during the exacerbation is characterised by delirium, which alternates and eventually passes into coma. The fever under these circumstances soon takes on an adynamic character, and a general depression of the vital functions early terminates in death.

M. Baumes also describes remittent fever when complicated with pectoral disease. This, however, is comparatively rare. When however it does occur, the pleural or bronchitic inflammation immediately shows itself by the symptoms usually attendant on these conditions.

Remittent fever in all its varieties may terminate in perfect recovery, or be converted into intermittent disease, or superseded by other affections. It may terminate in death by syncope, convulsion, or exhaustion. Death may ensue either in the first paroxysm, in the third, or in any day of the fever subse-

quent to these. If it occur in the first paroxysm, it is usually accompanied by delirium, which subsides into a fatal coma; but if it occur in or after the third paroxysm, it usually takes place by fainting or by convulsion, which are attributable to inflammation of the brain; or it may ensue from the weakening effects of the excessive discharges both alvine and cutaneous, or from the abdominal lesions generally, or it may occur from general exhaustion of the vital powers. Perfect recovery usually takes place between the fifth and eleventh days by the supervention of critical perspirations, by critical bilious discharges, or by the appearance of vesicular and pustular eruptions. Sometimes the disease gradually abates after the seventh, fourteenth, and twenty-first days. When remittent is converted into intermittent fever, the change usually takes place after the third or seventh day, taking the form either of quotidian, double tertian, or tertian ague. The other diseases which remittent fever usually passes into, are such as depend upon lesions of the organs which have become complicated with it: the most usual are, hepatitis, chronic disease of the liver attended by dropsy, and dysentery; besides which, cases are mentioned of pulmonary disease, permanent insanity, hydrocephalus, disease of the kidneys and bladder, together with a tendency to obstinate ulcerations, especially of the lower extremities.

Anatomical characters. The appearances which have been met with after death, in those who have suffered from remittent fever, are numerous, and, in many respects, not unlike those observable in intermittents.

The external appearances are, a collapsed state of the body, general yellowness of the surface, with here and there livid spots. On examining the *head*, a small quantity of fluid is usually found between the cranium and dura mater. The dura mater is inflamed and its vessels are turgid; the vessels of the pia mater are particularly so; and between it and the arachnoid, masses of coagulable lymph are often deposited. The ventricles are frequently distended with serum, and the choroid plexus is deeply injected. Burnett says, that the thalami and corpora striata have a firm glandular consistence. In the cavity of the *chest* inflammation of the pleura with serous effusion and adhesions, and inflammation of the bronchial membrane with an engorged state of the parenchymatous structure of the lungs, are met with. The heart is usually flaccid and easily torn. In the *abdomen*, the liver is found enlarged, injected, and softened in structure, and is generally of a dark, sometimes of a grey, colour. The gall bladder contains a small quantity of inspissated bile, which is sometimes very dense and hard. The stomach is usually inflamed, especially towards its cardiac orifice, and in many places covered with a chocolate-coloured gelatinous matter. The intestinal canal presents much the same appearances as the stomach; occasionally there are slight ulcerations. The intestines are almost invariably distended by flatus to a most unusual extent. The kidneys are frequently inflamed; the bladder contracted, and its inner surface covered with blood. The mesenteric glands and pancreas are often enlarged, as is likewise the spleen, which in its broken-down character resembles the appearances presented in ague. The whole muscular tissue is softened, and seems to have lost its tone and contractility.

The *duration* of remittent fever is influenced by many circumstances, but more especially by the form which it assumes. The simple is the most protracted, occasionally extending from two diurnal paroxysms to a period of five, six, or even eight weeks.

The inflammatory form, under favourable circumstances, does not maintain its acute character longer than three days, but ultimate recovery is much longer deferred. In fatal cases death frequently ensues on the third exacerbation, though it is generally delayed until the fifth or seventh day. In the malignant form, death has been known to occur in the first paroxysm; but it is usually postponed until about the third or fifth day. In favourable cases the convalescence is often very protracted.

Prognosis. The circumstances which indicate a lingering attack, or a fatal

termination, are symptoms denoting inflammatory complication, especially in the brain or its membranes, a depressed state of the system, or coma supervening upon delirium. Death may also be expected, when the remission is but slightly marked, when the skin assumes a deep yellow tint, but especially when suppression of urine, diarrhœa, or dysentery, supervenes.

A favourable termination may be generally looked for, if, at the commencement of the disease, the premonitory symptoms be well-marked, and of moderate duration; if the headach, pain in the epigastrium, and prostration of strength be not considerable; if the pulse be soft and of moderate strength, the surface uniformly moist, and not clammy to the feel; and if there be absence of severe gastric affection, of dyspnœa, singultus, subsultus, and the yellow colour of the skin; if the bowels be moderately open, and free from pain or distension; if the eyes be not suffused, nor the conjunctiva yellow; if the thirst and other febrile symptoms abate, and more especially if the mouth and face become covered with eruptions. The chief circumstance in the history of remittent fever which tends to embarrass the prognosis, is the occurrence of the calm on the third day already alluded to. Although this almost total intermission from disease often proves critical, and the forerunner of recovery, it must always be viewed with the most careful suspicion, when it supervenes upon symptoms in any way characterised by severity or malignancy.

The susceptibility to remittent fever appears equal in both sexes, and at every period of life; but males, from their occupation, are more exposed to its exciting causes. Soldiers and sailors serving in hot latitudes, where the peculiar miasm occurs, are very liable to it. Individual constitution exerts great influence, both in respect to the primary susceptibility to remittent fever, and the character it may afterwards assume. Generally speaking, the inflammatory variety prevails in those of a plethoric habit, the malignant among the weak and languid, persons of a bilious habit, those who are weakened by previous disease or intemperance, or who have frequently suffered from gastric irritation. Climate and situation evidently exert a manifest influence on remittent fevers. In districts where the miasm is generated, places near its origin, or low and ill-ventilated localities, one or other form, but more especially the malignant, prevail. In temperate countries it usually assumes the simple and inflammatory character.

Every variety of the disease appears to be most severe in the autumn, and to be influenced by changes in the weather; thus it is observed to be particularly severe after a very wet summer; in a hot summer after a wet spring, or during a wet season after previous heat. In the tropics it has been frequently noticed to prevail epidemically, when the summer has been unusually warm after a peculiarly wet season. If the disease occur in the early part of summer, the cerebral symptoms predominate; while after August, or during the autumn, the gastro-enteric complication, with tendency to dysentery, prevails. Dr. Craigie says, that in very dry summers, where the winds are light and infrequent, and the atmosphere calm and undisturbed, remittent fevers are more frequent in occurrence, more rapid in progress, and more violent in symptoms.

Nature. What has been stated as to the causes, both proximate and remote, of intermittent fever, applies in great measure to remittent. As regards the proximate cause, those who advocate particular theories, as to the nature of fever in general, see them illustrated in the phenomena of remittents. Cullen, who considers this form to be a variety of the intermittent fever, refers its immediate origin to spasm of the extreme vessels. Pinel, who believes that remittents arise from disease in the capillaries of the brain and stomach, terms them *meningo-gastric;* while Dr. Craigie, one of the last who has followed out this view, says, that this morbid action is not so exclusively confined to those parts as to justify their being so called; but that the process of remittent fever, whatever it be, is evidently diffused over the whole capillary system of the

brain, the lungs, the alimentary canal, the secreting glands, the liver, pancreas, and kidneys, as also over the muscles and bones. In short, that it is like fever generally, an affection or disorder of the capillary system of the whole frame. He endeavours to explain the phenomena upon the supposition, that although this capillary disorder be general, yet it displays its effects more conspicuously in different organs, at different periods of this disease, and that the stages of remittent fever are the result of these changes. (*Practice of Physic.*)

Dr. Stevens attributes the origin of this fever to a disorganised state of the blood, as evinced in its black crimson color, which he states to be a certain proof of the entire loss, or at least of a great diminution, of its saline ingredients. It must be admitted that a great many of the phenomena of fever cannot be explained upon the supposition of local inflammation being its sole cause; and accordingly Dr. Stevens has endeavoured to show that in fevers produced by marsh miasm, or by contagion, the diseased action in the solids is as much the effect of the altered condition of the blood, as it is in those cases where fever is induced by injecting a putrid or a poisoned fluid directly into the circulating current; and that the remote cause first poisons and chills the blood, and after a time paralyses the heart's action, thus giving rise to the cold stage. According to this theory the first link in the chain of morbid phenomena in essential fevers is, the vitiation of the blood— a condition existing even before the attack in all the fevers produced by aërial poisons; and that to this cause is also to be attributed the functional disease in the solids, the derangement in the secretions, and the sudden variations in the temperature, not merely of a part, but of the whole system. Though Dr. Stevens is perfectly correct as to the fact, that the state of the blood is very different in fever from that in health, yet we must repeat our conviction, there is much wanting before his views can be undeniably established.

From the affinity which remittent disease bears to intermittent, there is every reason to believe that they are produced by the same remote causes: observation fully justifies such a view; and all writers agree that the remittent fevers arise chiefly from marsh exhalations. On the other hand they have appeared during the intense heat of tropical climates, and in such instances they doubtless originate in terrestrial exhalations. We believe, however, that this origin is less frequent than has been supposed, and that more accurate observation will show, that there are in these localities, marshes, undrained sands, or other sources of miasmatic exhalations, which had been overlooked. It has been remarked, that when remittent fevers arise from rapid terrestrial desiccation, they are very violent, approaching the malignancy of yellow fever.

Whatever may be the nature of the specific poison thus exhaled, it appears capable of remaining dormant in the system for several weeks, and, according to Dr. Stevens, for an incredible length of time, even for months, without producing its specific effects. He likewise thinks, that it may be neutralised or so altered in its properties, as to be incapable of producing its peculiar action on the human system. This view is founded on the observation, that in the Genesec country, where the inhabitants during the hot months are exceedingly subject to violent and often fatal attacks of the marsh fever, those persons who are employed in the saltworks remain exempt from the marsh fever, although the salt factories are situated in the lowest part of an extensive swamp.

Diagnosis. The diseases with which remittent fever may be confounded are chiefly the quotidian and double tertian intermittents, the yellow fever, and the seasoning fever, of the West Indies.

The continued febrile condition, and the vomitings and tendency to discoloration of the surface, are however characters which sufficiently enable us to distinguish it from the intermittents; at the same time the passing of the one into the other is so frequent, that accuracy in diagnosis is rendered difficult, and not always to be relied on. In fact many authors have described them as varieties of the same type, as they likewise have the yellow and the sea-

soning fever of the West Indies, between which and the remittent diagnosis is more difficult. It appears, however, now to be well-ascertained, that they are distinct diseases; but this opinion has in great measure obtained rather from their general history than by any very defined differences in their symptoms. Dr. Stevens states, however, that they are totally separate and distinct from each other, and easily distinguished, particularly in the beginning.

The yellow fever differs in the following particulars:—Though the patients may suffer from a sensation of cold, they never shake or tremble. The fever is never one of type, but is invariably continued. There is an expression of countenance which is peculiar to it: Dr Stevens says, that though it is not so marked as the expression in tetanus, it is so distinct, that those who have seen it once easily recognise it. The stomach is irritable even from the first, and the liver is affected early in the disease; the bile is peculiarly acrid, corroding the ducts, and inflaming the intestinal canal. There are generally cramps, which rarely occur in remittent disease. But of all the distinguishing characters the most certain and constant is the black vomit of yellow fever: it is not unlike sooty water, a character of vomited matter which never prevails in remittents.

From the seasoning fever of the West Indies it may easily be distinguished, as this is characterised by having no premonitory stage nor cold fit, no inflammation of the stomach or liver, by the tongue being clean, and the pulse full and incompressible. That these several collections of symptoms to which these different names have been given, are essentially distinct diseases, is rendered quite obvious when their whole history is taken into consideration. To enter upon this would however not only be too lengthy for the limits proper to the discussion of this disease, but would in great measure be otherwise out of place.

Treatment. The indications of treatment in remittent do not materially differ from those of continued fever, which have elsewhere been fully treated of. The points more particularly to be attended to are, the reduction of the general fever, the obviating the effects of congestion and inflammatory action in the liver, stomach, and intestines, as also in the brain and its membranes.

The disease of the general state of the system is to be obviated by the prompt administration of purgatives, in order to clear the primæ viæ from the morbid secretions found in the stomach and intestines; the reduction of the over-excited heart's action by bloodletting and the use of medicines of a diaphoretic nature. With the exception of some of the French writers, all practitioners agree on the necessity of administering purgatives; at the same time they are to be used with considerable judgment, as much mischief frequently accrues from their abuse. If violent and irritating cathartics are too unsparingly administered, they are very apt to set up an irritation in the mucous lining of the bowels, which is attended by consequences so imminent, as often to be the source of more serious alarm than the effects of the disease itself. There can be no greater mistake in the treatment of remittent fever, than the exhibition of a rapid succession of this class of medicines. They tend rather, by their local irritation, to increase the acrid nature of the secretions. At the same time it is absolutely necessary, especially at the onset of the fever, that effective evacuants should be administered; but those selected for this purpose should be but little irritating or drastic in their operation. The use of purging enemata will be found very useful adjuncts to the employment of purgatives, but they must by no means be solely relied on; and where there is much gastric irritation, and there are but few cases where there is none, a small quantity of the syrup of white poppies should be added, the addition tending very much to allay pain and to soothe the system.

The employment of mercury has been much canvassed by practitioners; the greater number recommend its employment, but the extent to which its exhibition has been pushed by some, we feel persuaded, cannot be advantageous. Dr. Eberle (*Practice of Physic*) however, who for more than fifteen years employed this remedy in nearly every case of remittent fever that came under

his superintendence, administered it very freely during the two or three first days after the attack. Though he states that a gentle mercurial impression is beneficial, he condemns strong mercurialisation or ptyalism. In the great majority of the cases he treated, he found all the symptoms of the disease abate, often very considerably, as soon as the mercurial influence became evident, and that in many instances a speedy convalescence ensued. To obtain these results the calomel should be early and regularly administered, and continued until slight manifestations of its specific influence on the system have become evident by soreness of the gum, when its use must immediately be suspended. Many, however, are much more strenuous advocates for its exhibition; but even these agree in condemning its use except in the earlier stage. (Ferguson, *Med. Chir. Trans.*, vol. ii.) After the fifth or sixth day its constitutional operation is obviously productive of mischief. As calomel is very apt to produce active purging, it is generally advisable to combine with it a small quantity of opium, perhaps the Dover's powder is the most advantageous form. We should strongly recommend, that unless there be signs of congestive or inflammatory action present, calomel as well as active purgatives should not be resorted to. The thin, watery, muddy, reddish, and fetid stools, the tympanitic and tender state of the abdomen, and the cerebral irritation which frequently occur in the latter period of the disease, are very generally the results of the frequent use of active and irritating cathartics. The course to be pursued in respect to the use of this class of remedies, is to exhibit on the very commencement of the disease an active purge, either the extract of colocynth by itself or combined with mercury, followed by the mildest evacuants, so as to produce two, certainly not more than three, evacuations in the twenty-four hours. This action should be gently maintained during the progress of the fever; and, for this purpose, seidlitz powder, small doses of Epsom salts, castor oil, or rhubarb, are the most convenient. The employment of a mixture composed of magnesia and castor oil has been much recommended. It is made by mixing very intimately an ounce of the oil with a drachm of the carbonate of magnesia, with the addition of about an ounce of any of the usual syrups: of this a quarter part is to be taken every hour, or every two hours, until the bowels are moved.

The use of emetics has been much approved of by some practitioners, but the majority are decidedly averse to them. They appear peculiarly liable to upset the stomach, a condition which is apt to supervene without any cause of this kind, and is at all times very alarming and difficult to control. The too common result of their employment, during the first stage, is to set up a gastric irritability, and in the more advanced stages to increase the tenderness and tympanitic tumefaction of the bowels. Under such circumstances the disease is apt to run a tedious course, the abdomen remaining sore on pressure, and the alvine discharges often becoming watery, reddish, and irritating, in their passage through the lower bowel; in short, there is every manifestation of great irritation, if not of inflammation, in the intestinal mucous membrane. Lind is decidedly opposed to their employment, and states he can assert with confidence, that when given in doses which produce full vomiting, they are attended by the most unfavourable effects, headach, vomiting, and all the local affections, being much aggravated by their use. They seldom or never succeed in removing nausea, or in producing a critical perspiration; but, on the contrary, appear to hurry on, with greatly increased gastric irritation, the second stage of the disease.

Bloodletting formerly was esteemed if not a very injurious mode of treatment, at least to be very equivocal in its effects. In the present day bloodletting, both general and local, is almost invariably resorted to. For an appreciation of the true value of this remedy we are greatly indebted to Dr. Irvine, who published the results of this mode of treatment in the cases of remittent fever that came under his observation in the Mediterranean. These results

were most satisfactory. The statements of Sir William Burnett are also highly confirmatory of its being a most valuable mode of treating this disease. He says, that in the first stage of the disease, the inexperienced or inattentive observer is too apt to be led astray by the prostration of strength, the watery eye, the oppressed pulse, the anxious look of the patient, and the disposition to syncope on abstracting a few ounces of blood from the arm. The disease, however, is at this time a purely inflammatory one, and easily managed: bloodletting, both general and local, should therefore be resorted to, and repeated according to the urgency of the symptoms. It will often happen, after a few ounces of blood have flowed, that syncope will be induced: this must not prevent the repetition of the bleeding as long as the symptoms in any way indicate that it is required. In the course of an hour after the fainting is recovered from, it may generally be repeated even to the extent of thirty or forty ounces without again producing it. He moreover affirms (*op. cit.*, p. 21.) that syncope is less likely to occur when the blood is taken from the temporal artery; a mode of abstracting blood he particularly advocates. He states that he has often seen a bleeding of thirty ounces from this artery, aided by a brisk purgative, put an end to the disease; the headach, if not entirely removed, being greatly ameliorated; and that in many instances so immediately, that the patient has declared he felt the pain escaping with the blood. If before this evacuation the pulse should have been oppressed, it will rise under the lancet, and patients who have been carried, so great has been the apparent debility, have, after the loss of the thirty ounces of blood, risen and walked about, expressing their surprise at their former condition. The relief thus obtained is not in all cases permanent; the patient must be carefully observed, and on a return of headach, increased vascular action, heat, or other symptoms of pyrexia, the lancet must again be resorted to.

Though bleeding is now universally allowed to be a judicious operation in remittent fever, yet it must be borne in mind that age, constitution, and climate, modify very much the extent to which it is to be pursued. This is, however, so obvious, that it scarcely requires being alluded to. It may nevertheless be not out of place to observe, that the English, who visit countries where it is endemical, and there become subject to the influence of remittent fever, bear, for the most part, abstraction of blood to a much larger extent than is usual in the natives themselves; and also, as a general law, that in very dry climates it is a safer remedy than in the humid.

To obtain an uniform perspiration is of the utmost importance. At least such is the view we entertain, though it is opposed to that of Burnett, who states that sudorifics have never appeared to him to be attended with the smallest advantage, especially when employed in the early stage. He says, that it is well-known to every practitioner, that they often fail in inducing perspiration, and, under such circumstances, their general action cannot but be highly unfavourable; and, at the commencement of the disease, the patient is often covered with a profuse perspiration, from which he derives no relief. We cannot but view this statement as overcharged and erroneous. Most writers agree that saline draughts, the acetate of ammonia, and medicines of that class, are eminently useful, especially when the warm or tepid bath or even cold sponging are employed to aid their effect. These may be employed according to circumstances, with the best effects, especially if, after due evacuation, an undue vascular action with headach remains. Connected with the subject of saline medicines, we must mention the plan recommended by Dr. Stevens. It consists in the free use of neutral saline salts, those which he more particularly recommends being the carbonate and chlorate of potass. There can be no doubt that these are of great service, but scarcely, in our opinion, to the extent which he has been led to imagine.

If the disease show disposition to localise itself, depletion and the application of counter-irritants should immediately be resorted to. Should the stomach

or bowels be the chief seat of irritation, a large poppy-head poultice will often give speedy and permanent relief. In addition to these, mild diluents should be freely allowed.

Such then is the general line of treatment to be followed in the first stage. As the disease advances, however, the remedial means which have been hitherto employed must in great measure be desisted from, or, at least, employed only with great caution. To the local affection the attention of the practitioner in the after period of the disease should in a great measure be directed, as from it most usually the severity of the symptoms proceeds. The topical application of leeches, or a blister to the neighbourhood of the affected organ, should be resorted to, and tepid bathing and saline remedies at the same time employed, together with the administration of saline draughts, or of the neutral salts.

Should the disease, notwithstanding the means pursued, arrive at its third and most dangerous period, little more is to be done than to keep up the strength of the patient by such diffusible stimulants as are usual in the last stage of typhus fever. Ammonia, combined with aromatic confection, has been particularly recommended under these circumstances, as has also musk and valerian; these latter remedies we believe to be very valuable. The oil of turpentine, in doses of thirty drops, is perhaps one of the most safe and useful medicines in this stage; it often immediately controls the character of the symptoms, and changes entirely the nature of the alvine secretions. In this stage the patient may be allowed any thing he may desire, in the way of nourishment or stimulants, as sago, arrowroot, spiced wine, porter, brandy, &c. The camphor julep is said to be very useful in allaying the singultus, which is so painful a symptom in the closing scene.

Such is the general sketch of the treatment which experience has taught to be most useful in remittent fever. It would have been out of place to have gone very minutely into a discussion upon it, as in great measure it is similar in its essential details to that pursued in ordinary continued fever.

When a complete remission is procured in the early stage of the disease, and this is followed by convalescence, it must be borne in mind that though a very urgent desire for food immediately takes place, it cannot with safety be indulged; indeed, the convalescence of no disease is so likely to be retarded, as that of remittent fever, by injudicious or excessive diet. The most proper is that which is mild and nutritive, and not that which is stimulating. It is but rarely in the first days of convalescence that wine or the bitter infusions are required.

Before concluding this sketch of the treatment, it will be necessary to say a few words on the use of those tonics, the employment of which in intermittent fever is so beneficial. Their employment in the treatment of this disease has, however, excited much difference of opinion. Some practitioners, amongst whom are Lind and Clark, have advocated the use of bark immediately the remission has set in, while others, among whom are Johnson and Burnett, most strenuously condemn it. The former speaks most decidedly, affirming that the exhibition of Peruvian bark, while symptoms of pyrexia remain, has been attended by the most mischievous effects. He says that, under its use, the mortality has been great, relapse frequent, and dysentery almost universal, in those who had the fever in a severe form; nor was there an instance, when given during the supposed remission of the symptoms, where it prevented a return of the paroxysm. Too often this medicine has been given with wine at the commencement of remittent fever, the consequence of which has been, that the tongue has put on a brown, dry, and furred, appearance; the anxiety, delirium, and irritability of stomach, have been much increased, while the whole train of nervous symptoms have soon become formidable, resisting every means of alleviation, till death has put a period to the sufferings of the patient.

YELLOW FEVER.

Nomenclature.—Premonitory symptoms.—Symptoms of the first stage—of the second—of the third.—Inflammatory form.—Adynamic form.—Malignant or congestive form.—Terminations.—Anatomical characters.—Statistics.—Prognosis.—Diagnosis.—Nature.—Causes.—Treatment.

Yellow Fever is a disease which is not of infrequent occurrence in the West Indies, in Africa, on the eastern coast of Spanish America, on the southern shores of Spain, and western shores of America. It has been described by writers under the several names of *Typhus icterodes, Bulam fever, Bilious remitting fever, Vomito negro, Vomito prieto, Endemial causus, Mal de Siam,* &c. &c. To those commencing the investigation of yellow fever, it must be matter of much surprise to observe the contrariety of opinion which has been entertained, both as regards its nature and origin. Much of this has arisen from its symptoms being very varying and irregular in different cases, and under different circumstances: indeed, the changeableness of its phenomena renders it a matter of great difficulty to arrive at any thing like a succinct and appropriate nosological definition. Dr. Gillkrest, who is the last and one of the most intelligent of the writers on this disease, says, that it is a fever in which "yellowness of the skin, partial or general, and, towards the fatal termination, vomiting of a black or dark brown fluid are frequent, *though by no means constant,* occurrences." (*Cyc. Pract. Med.*, art. Yellow Fever.) This evidently amounts to no definition at all, and others which might be quoted are equally inapposite. Feeling the difficulty of supplying this deficiency by one that is unexceptionable, we prefer recognising the disease only from its general description. In doing this it is proposed, first, to take a view of the simple or more usual form in which it occurs, and then of the more prominent varieties which may be referred to one of three divisions, which we propose to designate, 1. *The inflammatory*; 2. *The adynamic*; and, 3. *The congestive, or malignant.* These, we feel assured, after much consideration, and a careful review of the works of those who have enjoyed ample opportunity of accurately observing yellow fever as modified by climate and situation, will enable us to give a full and comprehensive history of its phenomena.

The attack is for the most part, though not always, preceded by well-marked premonitory symptoms. These vary according to the peculiarities of constitution: generally speaking however, for two, three, or four days, the mental energy and natural activity of disposition are depressed, and the spirits are low, without any accountably apparent reason. There are also occasionally faintness and debility, with slight creeping chills and nausea, pain in the loins, back, and extremities, some slight pain and giddiness in the head. The eyes, with a suffused ferretty appearance, look dull and watery, a heavy pain is experienced in the eyeballs and brow, and the vision is dim and sometimes double. There is often also slight confusion of thought, and the patient, though desirous of rest, is unable to take it, being oppressed by a drowsy restlessness. The taste is perverted, the appetite bad, accompanied occasionally with sensation of heat of stomach, and dull pain in the right side; very frequently there is a flatulent and inactive state of the bowels; but this can in no way be depended upon as an initiatory symptom, as it not unusually occurs, that the opposite condition, slight diarrhœa, obtains. The same may be said in respect to the state of the skin; for, as Dr. Rush observes, the premonitory period is sometimes marked by a disposition to sweat at night, or after very moderate exercise; while at other times there is a sudden and

complete suppression of the cutaneous secretion. Boyle (*On the Diseases of Africa*, p. 128.) who confirms this, nevertheless states that the temperature of the skin is always above the natural standard. The pulse varies in many respects; in some cases it is small, hard, and, as it were, contracted; in others soft, fluttering, or undulating, and as often regular as irregular; occasionally it is full, open, and bounding. This series of phenomena, as before said, does not always take place. Occasionally it happens that persons apparently well on going to bed at night have awakered with a chilliness, which is immediately succeeded by the disease itself; others, again, are seized at work during the day, after having passed the previous night in a natural and refreshing sleep.

Occasionally, though very rarely, the premonitory symptoms are accompanied by a yellowness of the skin and eyes. Such a state usually augurs severity in the after disease. In these cases, even before the fever can be properly said to have manifested itself, there is vomiting of green bile; and the early alvine evacuations, at least those which are procured from the lower bowel, scarcely ever fail to exhibit a very dark tar-like appearance, and to emit a most offensive odour. Sometimes the initiatory period is characterised by absence of all pain, but the patient expresses himself as being merely inconvenienced by an indescribable sensation of general *malaise*. According to Dr. Rush, some of these symptoms frequently continue for two or three days before the patients are attacked by the fever; while with some persons they continue throughout the time the yellow fever remains epidemic, without being followed by the disease.

The commencement of the fever, which, according to Sir W. Pym and Dr. Smith, most frequently takes place during the night (according to the latter in four fifths of the cases), is occasionally, though not often, attended by a slight shivering fit. The most usual course is, that the initial symptoms are succeeded by a state of general excitement, which sometimes increases to a most unmanageable and distressing extent, and by the accession of severe pain in the eyeballs and head, in the back and loins, and severe cramps in the calves of the legs. The position which the patient assumes is almost always the recumbent, when he invariably lies upon the back, and exhibits a constant disposition to throw the arms above the head. The countenance is expressive of deep-seated pain; it is usually flushed, sometimes to a crimson hue, and occasionally swollen to so great an extent as to appear bloated and heavy. The eye presents appearances which furnish some of the chief characteristics of the disease. This organ is swollen, deeply injected, and moistened by tears, and has a dull or rather heavy drunken appearance — which peculiar expression is apparently owing to the cornea either retaining its natural, or else assuming a more than usually brilliant, appearance, while the interstices between the fully injected vessels of the conjunctiva remain of a white colour. Sometimes these vessels are so thickly injected, as to give that portion of the membrane through which they traverse a beautiful pink colour. There is generally also considerable and permanent dilatation of the pupil, and the balls are often protruded, and seem ready to start from their sockets. Chisholm makes the remark, that it often happens the right eye is the most considerably affected; and that, when this is the case, the pain is felt chiefly in the right side of the head. The skin is flushed, dry, and warmer than natural, but it has not that peculiar feeling of pungency often observed in typhus fever. Warren, in his description of the malignant fever of Barbadoes, speaks of the skin being more often embued with moisture, and that generally there is a disposition to free perspiration: however true this may be in the after periods of the disease, it is decidedly not the case in the first stage. The pulse is accelerated, and generally full, soft, and compressible; sometimes it is unusually slow; and cases are recorded where it has not exceeded forty-five, and, according to Chisholm and Physic, thirty. Under these circumstances the temperature of the surface is usually, unnaturally cool. The tongue is swollen, flattened, pointed, and

coated with a white moist slime. Though occasionally the pain of the præcordia is severe during the first stage, it is yet not generally so; in fact, the stomach appears free from irritation; and vomiting, which so often accompanies the initial symptoms, now appears to be quite suspended. According to Moseley this shows that the derangements in the functions of this organ are rather owing to irritation than to superabundance of bile, as some have supposed. When however pain and extreme distress are experienced at this period, there is usually much epigastric tenderness, and spasms of a most violent kind take place, both in the muscles of the abdomen and legs; vomiting may now ensue, but what is thus voided consists entirely of the ingesta. The bowels appear in many instances to be little if at all deranged; generally, however, there is a tendency to costiveness; but, even under such circumstances, the motions which are procured by the aid of medicine, instead of being bilious, soft, or liquid, are formed, healthy in character, and without any unpleasant fetor. The respiration is usually nervous, hurried, and attended by constant deep sighing; the anxiety of breathing appears to keep pace with the heat of the surface. As the temperature of the skin rises, so does the respiration become more hurried. The intellectual functions are more or less disordered; now and then coma comes on, which is usually preceded by a sudden and short attack of delirium.

This first stage continues from twelve to thirteen hours; its decline is marked by slight tendency to moisture on the skin, with a prostration of the mental and bodily powers, a state which Moseley has termed a collapse or metaptosis. This state has often been mistaken for a remission, instead of which the symptoms are becoming more severe. The excitement which has been maintained during the previous stage is superseded by a state of depression, characterised by collapse of the features, paleness of the surface generally, and a total absence of pain; while at the same time there are evident signs of supervening irritability of the stomach, and a general tendency in the vessels to throw out blood.

Before long, the second stage fairly sets in, and with a more formidable array of symptoms than might have been expected from those which were the attendants of the first stage: the position of the patient is uneasy and constrained; the hands and arms are constantly twitching, and the legs frequently drawn up towards the abdomen. The countenance, though not so florid as in the previous stage, yet retains a considerable portion of colour, which partakes rather of a damask hue, from being blended with the yellow tinge of the surface, a colour which the skin now begins to assume. In the eye similar changes are perceptible; the inflamed and injected state of the vessels begin to subside; the eye thus becomes less turgid, while the conjunctiva, especially towards the inner canthus, begins to take on a deep yellow colour, which very early extends itself down the alæ of the nose, and round the mouth. The whole expression of the countenance becomes altered, and in place of the excited aspect which the features have hitherto assumed, they are now expressive of a deep-seated anxiety, giving the character of a sad, depressed, and pensive state of mind. The moisture, which showed a disposition to pervade the surface of the skin, does not fairly come out, but is unequally distributed in patches over the body, some portions maintaining their dryness and slight elevation of temperature.

Though in many of the milder cases the yellow colour does not extend generally over the surface, but is confined to the conjunctiva, yet most commonly, as this stage advances, the skin becomes of a yellow tinge, varying in hue according to circumstances. If the complexion of the patient be fair, it is generally of a light, or what may be termed pale lemon, or even of a bright golden yellow, passing, as the disease advances, into a greenish-mottled and bruised appearance. In those who are naturally sallow, it assumes a deep orange or saffron colour; in some it resembles a vegetable stain of a dingy

yellow tint, in others it is not unlike that cadaverous hue which is seen on the surface of bodies in the first stage of putrefaction. These changed colours of the skin are sometimes maintained until, and even after, death. Though this condition, if fully developed, is an almost certain prognostic of a fatal termination, it is by no means constantly so; nor are the accompanying symptoms always severe in themselves. Townsend observes that, in some few mild cases, the only symptom was this peculiar greenish yellow tinge, which gradually came out and spread entirely over the trunk and extremities, while the pulse, skin, and other functions, remained perfectly natural. (*Account of the Yellow Fever*, p. 151.) Dr. Harrison relates a similar case, in which the patient continued to walk about for several days, as though he was in perfect health. In this case the stomach and other organs regularly performed their duty, but black vomit suddenly came on, and death took place in a few hours.

The pulse, though slightly lessened in frequency, is still full, but softer and less resisting: occasionally it falls below the natural standard, but as yet it is never found to intermit. The tongue, though sometimes retaining its moist and dirty white coat, usually acquires a dry yellow crust, especially towards its root, the edges and tip having a clean and dry red appearance; and in cases which have a fatal tendency, it is frequently tremulous on being protruded. The lips are dry, parched, and sometimes cracked; they look glossy, and more florid than is natural, while their superficial vessels show a tendency to ooze out blood and sanies. The stomach becomes irritable and painful, especially on pressure, the passive state which prevailed during the previous stage, is now very sensibly superseded by the most active functional disorder. Food or medicine are immediately rejected. The sensation of internal heat in this viscus is particularly distressing; at the same time there is a remarkable absence of nausea. The vomiting which takes place is sudden, and not accompanied by any continued or severe retching. Generally speaking, the matters vomited consist only of the ingesta; sometimes, however, bile is likewise discharged, which, according to Dr. Stevens, is exceedingly acrid, and frequently it inflames the biliary ducts to such a degree, that when the secretion ceases the surfaces adhere, and after death they are impervious even to the smallest probe. (*On the Healthy and Diseased Properties of the Blood*, p. 218.) The acrid bile must be a source of irritation to the intestinal canal, and is probably the cause of the severe cramps: in some cases such is its acrimony, that when applied to the skin, it excited inflammation, and has been known even to corrode the pewter vessel in which it was received almost as rapidly as a strong acid. Flatulence is very frequent and urgent. The alvine secretions for the most part maintain a natural appearance, though in some cases they are dark coloured and evidently bilious. The secretion of urine is much diminished; in fact, there is an evident tendency to suppression, which occasionally continues for days; and, should the skin be yellow, the urine partakes of the same character. The respiration, though sometimes remaining difficult as in the previous stage, is, generally speaking, unembarrassed. Deveze however says, that the respiration is always difficult in this stage. Townsend very properly remarks, that one would suppose, by the indistinct manner of writers, that the respiratory functions were as much disturbed in this disease as in pleurisy. The only appearance of diseased action attending this function is, that the sighs are frequent, deep, and prolonged. Stevens says, that the breath which is exhaled has a peculiar acid odour, and that the degree to which this exists is perhaps the best criterion of the malignancy of the case. The intellectual functions are evidently deeply affected. The patient is either in a state of low muttering delirium, or in a comatose condition; from which however he may be roused, when he answers questions put to him pertinently, but soon lapses into his former condition. Sometimes there is a state of the most irritable and active delirium, during which he is particularly loquacious; in fact, his condition is

not unlike, in this respect, that of a patient suffering under the active stage of delirium tremens. Convulsions sometimes, though rarely, take place during this stage of the disease. The organs of generation are very liable to inflammation, accompanied with an adhesive sanious discharge. This stage is besides often accompanied by petechiæ of different sizes, occurring especially about the cheeks, neck, forehead, backs of hands, arms, chest, &c.; sometimes intermixed with small vesicles. A miliary eruption sometimes makes its appearance without the admixture of petechiæ. Besides these, there have been observed prickly heats (*Moseley*), boils and small abscesses (*Warren*), or white pustules (*Blane*). Carbuncle is very rarely met with: of 7000 deaths at Cadiz in 1800, there were only three instances of it.

This stage may continue from two to six or seven days, and passes almost imperceptibly into that of the third, which is characterised particularly by an aggravation of the previous symptoms. The countenance becomes more collapsed and anxious; the conjunctiva loses entirely its injected appearance, and passes from a yellow into a greenish colour, which, as Townsend remarks, when contrasted with the brilliant colour of a blue or hazel cornea, gives an unnatural and even grotesque appearance; the eye loses its full and prominent character; the eyelids become swollen and discoloured, especially the under lid, which has the appearance of blood being extravasated through its tissue; the surface of the skin generally is darker, and the discoloration extends over the whole body, with the exception of the feet, which are rarely yellowed until a short time before death. Not infrequently there appear dark coloured blotches and vibices on different parts of the body. There can be no doubt that these appearances are owing to a broken-down state of the blood, as is evidenced by this fluid exuding in a watery and bright coloured state from the mucous lining of the nose and mouth, or, in some cases, from blistered surfaces. The consequence of this exudation is, that much of it dries upon the external edges of the nostrils, lips, teeth, &c. The pulse becomes small and thready, though at times full and accelerated, yet compressible; the tongue now loses its white, moist, or brown character, and presents a dry, inflamed, raw surface — sometimes with a dry brown fur covering its centre; at times this organ has appeared to have been partially paralysed, so that the speech is indistinct, and the voice thick, but not diminished in strength; the mucous membranes of the eyelids and of the interior of the mouth become spongy and of a deep florid colour, while the lips are pale or livid; the voice becomes hoarse; the patient complains of the throat itself being dry; at the same time thirst, which is a rare symptom in the earlier parts of the disease, becomes urgent, leading to the inference that this symptom is owing to the local state of the part, and not to the general condition. It is worthy of remark, that yellow fever is not attended by those disagreeable cadaverous smells so often observed in other fevers. As the disease advances, the pain in the region of the stomach increases, and the least pressure adds to the patient's agony. An eructation of wind, or swallowing fluids hot or cold, causes an involuntary drawing up of the legs.

This state is followed by vomiting of a grumous looking fluid, which has been technically called the *black vomit* — in fact, it has in some countries given the name to the disorder: thus in Spain, from the occurrence of this peculiar symptom, it is called the *vomito prieto*, or *negro*. This vomiting does not, however, always occur, even though the nausea, and other evidences of stomach affection, may be present. The alvine discharges often retain, even to the last, a healthy appearance, and are totally devoid of nauseating smell: sometimes, towards the end of this stage, while the dejections are evidently composed of the same grumous exudation as the black vomit, they often assume the natural appearance, even when the other symptoms indicate an aggravation of the disease. As this stage advances, the anxiety and restlessness increase to a most distressing extent, which, with loss of sleep, portend danger. The intellect is not so much affected as might have been expected; though there may be excitement and slight confusion, there cannot be said to be delirium. The re-

spiration is hurried, noisy, and evidently laborious, the muscles of the neck and chest being violently brought into action to support the effort required. The whole appearance of the patient is that of exhaustion. The surface and extremities become very cold, and covered with a general clammy perspiration, excepting over the hypochondriac regions, where the temperature is still maintained. Tremor and subsultus sometimes, though not very commonly, ensue, and occasionally there is strabismus. Townsend says, however, that more frequently at this late period of the disease, the eye and countenance remaining calm and perfectly natural in their expression, and the intellectual functions unclouded, the patient lies tranquil and unconscious of danger, and expires without a struggle. Dr. Rush says, the last hours of life in some were marked with great pain and strong convulsions, but in many more death seemed to insinuate itself into the system with all the gentleness of natural sleep. To the experienced eye, however, the general expression, the unsteady small pulse, the clammy perspiration of the forehead, &c. too truly betray the alarming condition of the patient. In some very aggravated cases a curious state has sometimes occurred, notwithstanding the depression of the powers,—the patient rises from his bed, and in a staggering manner walks about, and really effects feats of very considerable exertion, sometimes even with the appearance of so little weakness that, to bystanders, it scarcely appears the patient is labouring under disease. This form of yellow fever has been called the *cold walking fever.*

Such may be esteemed to be the more ordinary symptoms of yellow fever. There are, however, many deviations from these, and which, from occurring in different years and at different places, have given origin to the contradictory statements and opinions as to the very nature of the disease itself. The variations are, however, to be regarded as merely those departures from its more usual course to which it, in common with other forms of fever, is liable. These we shall endeavour to point out under one of the three following divisions:—The *inflammatory*, the *adynamic*, and the *malignant*. 1. The *inflammatory* form commences with initial symptoms characterised by more weakness and faintness and nausea, which, after a period of ten or twelve hours, are followed by sudden development of excessive arterial reaction, more especially observed in the carotid and temporal arteries; the pulse is quick, generally full, tense, and strong; there is much anxiety and constriction of the præcordia, with hurried breathing, and desire for cool air; while the nausea increases, and terminates in retching or vomiting; the face is frequently flushed; the conjunctiva deeply injected, and gives the countenance a heavy dull expression; the tongue is coated with a yellowish-white fur; the thirst is urgent; the skin dry and parched, though occasionally moist; severe shooting pains are felt in the head, loins, and extremities; the bowels are confined; and the urine scanty and high-coloured.

This stage lasts from twenty-four to sixty hours, and is gradually converted into the second, in which many of the symptoms are gradually subdued. The heat of skin completely passes off, and is succeeded by chilliness, and the pulse becomes more slow and soft. Though these appearances may appear favourable, there arise too many other indications of a contrary tendency. The eyes look glassy; there is confusion, and occasionally low muttering delirium; the pain and sickness of stomach become more urgent, and the vomiting more frequent; the skin is embued with a clammy moisture; the tongue is dry, covered with a brown fur, beneath which its surface is rough and cracked; the urine is in great measure suppressed, and the little that may be secreted is of a brownish-yellow colour.

After this state of things has continued with varying intensity from twelve to thirty hours, a change ensues, which is the commencement of the third stage: the pulse becomes rapid and intermitting; the pain accompanying the vomiting is distressing in the extreme, and the matters vomited are of a dark colour, not unlike coffee grounds; the tongue is black; the lips and mouth coated with a

black sordes; cold clammy sweats pervade the surface; and the whole skin becomes yellow, first commencing in discoloration about the mouth, nose, and temples. This state, when fully confirmed, is the commencement of a fatal termination; an event which is preceded by delirium, laborious respiration, convulsive sighing, subsultus tendinum, faltering voice, bloody exudations from the mucous surfaces of the nose and mouth, petechiæ, frequent vomiting of black fluid, burning heat of the stomach, hiccough, and eventually, coma.

This form of the disease varies greatly in intensity and in its period of fatality; occasionally the symptoms are so slight, that, though presenting all the characters of the inflammatory variety, convalescence is established without their having assumed any peculiar urgency; at other times they set in with such determined violence, that the patient sinks under their influence in the course of twenty-four hours: generally however, in fatal cases, the period is from three to five days. Its victims are usually of a full plethoric habit, such as might be called of a strong healthy constitution.

The *adynamic* variety, on the contrary, usually occurs in those whose frame is expressive of deficient animal vigour, and in whom the circulating system is for the most part depressed. The initial symptoms, which are often prolonged for days, are usually a varying degree of nausea and faintness, slight headach and confusion, with occasionally dimness of vision. On the attack setting in, there is sensation of great oppression, with severe headach and excruciating pain in the loins, legs, and feet; and, as in the former variety, tenderness in the region of the stomach, accompanied by nausea and vomiting, urgent thirst, and costive bowels. Unlike the inflammatory, however, the skin is usually soft and bedewed with a clammy softness; and, as Dr. Craigie describes it, "a fixed sensation of cold, pervading the person deeply, and rarely interrupted with flushing and other marks of heat, is slowly succeeded by a sensation of heat, which, though pungent at the epigastric region, under the arms, and inside the thighs, is seldom strong or high on the exterior of the person or the mucous surfaces." The tongue is white and moist, the pulse small and weak, the eye of a dingy colour, and languid in its movements, the whole expression of the countenance partaking of the same character. This state, which continues often for some hours according to the severity of the attack, is succeeded by one in which the above symptoms become aggravated, excruciating pain of the stomach, vomiting, general torpor, and low muttering delirium supervening. This state is followed by coma, during which the skin, now damp and flaccid, assumes an olive colour, and becomes spotted with livid vibices; the conjunctiva of a dirty yellow colour, and the countenance expressive of the fatal termination, which is usually accelerated by copious hæmorrhage from the nose, mouth, and intestines — the black matter which is now vomited, as well as the fæcal discharges, being mingled with the blood. This form of disease usually proves fatal within four or five days.

The *malignant* or *congestive* form of yellow fever is particularly characterised by early oppression, and the almost total absence of any symptoms of reaction. From the commencement the patient makes but little complaint, and, with the exception of pain in the region of the stomach, expresses no particular uneasiness. He lies quiet, and though there is very considerable muscular power remaining, makes no effort to move. He is for the most part taciturn, and might almost be supposed to be asleep, were it not for the eyes which are wide open: sometimes this state is slightly interfered with by transient delirium. The eye itself is of a dull red, and has a drunken, dull, agitated stare. The countenance from the very first is indicative of the malignancy of the disease; it is ash-coloured and mottled, has a confused sullen expression, and altogether presents a shrunk and deadly aspect. The skin is generally not elevated in temperature, but for the most part slightly chilled; which, as the disease advances, becomes more marked, and gives to the finger while touching it a most repulsive sensation. It early assumes a slight livid

colour, which rapidly increases to a deep leaden hue at the points of the fingers, tips of the ears, &c. and in many parts patches of a deeper and more putrid character show themselves. The pulse is small, intermitting, and eventually almost imperceptible. There is throughout the attack not the slightest evidence of any vascular excitement. The tongue is swollen, smooth on its surface, of a red or livid colour, and covered here and there with foul white patches. The stools, if passed, are white, and the urine is almost entirely suppressed. The respiration is laborious, and the black vomiting accompanied by hiccough sets in early. Few who are thus attacked recover; many die in the first twenty-four hours; others go on to the third day.

Such are the more ordinary forms which yellow fever assumes, each of which presents occasional variations, but they are not accompanied by such marked characters as to require particular description. One variety however may be noticed, as it has by many writers been considered a separate disease; it has been described under the names of the *African endemic fever*, the *climate* or *seasoning fever*, &c. Dr. Stevens, who very decidedly advocates the view of its being a distinct disease, describes it as differing from yellow fever in being indigenous, and in not being contagious, as he esteems the latter to be; that it is only met with as an epidemic during the hot months, when the thermometer is upwards of 88° during the day, and at least 80° during the night. It occurs generally in dry situations, very seldom in swampy districts, and only in solitary cases, except in those localities where there is an accumulation of unseasoned strangers, exposed to the action of a burning sun. He further states this disease to be confined to the whites, and almost entirely to those who have arrived lately from northern countries; while the African typhus, as he terms yellow fever, appears in the West India Islands in every locality and at all seasons of the year. It is not confined either to the whites or to those who have lately arrived: he has known it just as fatal to the negroes and creoles, who had never been out of the tropics, and equally mortal in the coolest weather as in the hottest months. He says it can easily be distinguished from yellow fever, from there being no marked premonitory symptoms, no cold stage in the commencement, no foulness of the tongue, no sickness nor irritation in the stomach, at least for the first twelve hours after the attack, no derangement in the biliary organs, no spasms in the gastrocnemii muscles. All the secretions are diminished, but there is no redness in the urine: the pulse in the first stage is not only incompressible, but the artery at the wrist is distended to a degree which is never met with in any other disease. He likewise states, that though in the climate fever the blood is diseased, it is not unnaturally dark in colour before the attack, which he states to be the case in yellow fever. Notwithstanding these strongly expressed opinions, it does not appear from other evidence that there is that dissimilarity which should entitle the so-called endemic disease to be separated from yellow fever. It appears from the observations of many who have had ample opportunity of satisfying themselves upon this point, that they are essentially one disease, only occurring under certain modifications. It is not a little singular that Boyle, who advocates the view of their being separate diseases, after describing at large the endemic fever, says, that the general character and symptoms of the epidemic, *i. e.* the yellow fever, bear so strong a similarity to those of the endemic fever, that it seems to be only necessary to refer to the description of the latter. We are inclined to believe that the climate fever is the ordinary fever of the country; and that, when it assumes an epidemic severity, it acquires those characters which are peculiar to yellow fever.

The nature and origin of the fluid discharged from the stomach, so characteristic of this disease, and which has been technically called *black vomit*, have been very differently viewed by writers. On the first appearance of this discharge it has a turbid reddish-brown appearance, is insipid, and perfectly inodorous, and settles at the bottom of any fluid with which it may have been mixed in the stomach. It presents an appearance not unlike coffee

grounds, and is so mingled with mucus, as to be ropy and glutinous to the feel; sometimes it is intermixed with small streaks of blood. Examined by a microscope, this coffee-ground-looking matter appears to be inorganic in its nature: when strained and dried on paper, to which it will adhere, it retains its dark brown and red colour, and exhibits the appearance of a powder, not unlike minute scales of smoky mica, both as regards colour and feel. From various experiments Dr. Cathrall concludes that the black vomit, besides a considerable proportion of water tinctured with resinous and mucilaginous substances, contains a predominant acid, which is neither the carbonic, phosphoric, nor sulphuric, but which he hints may be the muriatic. It likewise appears from his experiments, that when applied to the most sensible parts of the body, it produces little or no effect; that large quantities of it may pass through the stomach and bowels of animals, without apparently disturbing digestion or affecting the health; and that an atmosphere highly impregnated with its exhalation, does not produce fever under apparently the most favourable circumstances. From these facts he infers, that the speedy death which ensues on this discharge is not from any destructive effect of this matter on the stomach and bowels, but most likely from the degree of direct and indirect debility which precedes and accompanies it. (*New York Repository*, 1800.) With regard to the nature of this peculiar fluid, some state it to be vitiated and putrid bile; others, a mixture of blood and bile; some, that it is the sphacelated mucous coat of the stomach dissolved in a morbid secretion of this organ; others conceived it to be a morbid secretion from the liver. The view of Dr. Fordyce appears to be the correct one, viz. that it is identical with the incrustation on the tongue, gums, lips, &c. in violent fevers, and that, probably, it is an exudation from, and is formed upon, the surface of the stomach, and perhaps of the duodenum, or even the beginning of the jejunum. It is probably nothing but broken-down blood, which oozes from the secreting surface of the mucous membrane in place of its natural and proper secretion. The force of the exertion in vomiting often occasions a considerable quantity of bile to be secreted, which, being thrown back into the stomach, is brought up with the dark brown matter. When this happens, it gives to the fluid the taste and appearance of bile.

It does not appear that yellow fever is particularly complicated or altered in its character by the supervention of another disease, or by its occurring when some other disease is present. Amiel says, during the time it raged as an epidemic at Gibraltar, no other acute maladies prevailed: it seemed to have the peculiarity of modifying or completely changing the nature of the acute as well as of the chronic diseases. Dr. Smith and others state, that persons labouring under other diseases at the time they were attacked with yellow fever fell victims to it, and that this fatality appears to have been particularly marked in females in a state of pregnancy. Sir William Pym makes the curious observation, that several of those who were attacked had pulmonary complaints, and that in some cases these affections appeared to be cured in consequence.

Yellow fever may terminate in complete recovery, or the recovery may be retarded by chronic organic affections: it may also prove fatal. Though in many of the slighter cases convalescence takes place early and perfectly, yet there is very frequently the most decided evidence of organic lesions. The organs most usually diseased are the stomach and liver. The lungs, spleen, and nervous system, have also been observed to participate. Some writers state, that it occasionally terminates in fits of ague. Amiel says, that the rapid progress and the short duration of this disease leave no time for visceral obstructions to be formed; and the only sequelæ which he observed were, excessive weakness, an impaired state of the digestive organs, and, as a necessary consequence, a protracted and tedious convalescence.

Anatomical characters. The morbid appearances observed in fatal cases of yellow fever are very various. The external appearance of the body retains

after death much the same dusky yellow, grey, and mottled colour, which has been observed during life. Such parts as are as pending not infrequently become livid, while the extremities and scrotum in males are generally of a brownish-black. A line of a pale cast of yellow, from the nose to the pubis, has been sometimes observed. The generally darkened or discoloured condition of the integuments has induced many to suppose that the body is peculiarly liable to undergo a rapid decomposition; this, however, appears to be no more the case than it is in plague. The discolorations which are apparent on the surface, do not appear necessarily to involve any other tissue than that of the skin; for frequently the cellularmembrane immediately below, though said to be usually diseased, is often not in the least discoloured; occasionally, however, it is a little yellow. The muscular tissue is often darkened, softened, or even broken down: in some cases an uniform venous infiltration into the cellular tissue of the muscles has been observed.

On examining the head, the surface of the dura mater is found studded with dark-coloured spots, with patches of lymph here and there: there is usually infiltration of yellowish serosity, to a greater or less extent, under the arachnoid, with congestion in the veins and sinuses, though in some cases this is not very remarkable. The substance of the brain is firm and more vascular than natural, but in some very protracted cases it becomes softened. The choroid plexus is much distended, and, instead of presenting its beautiful appearance, looks like a clot of blood. The ventricles sometimes contain an excess of fluid. With regard to lesions in the vertebral column Dr. Gillkrest says, that in examinations conducted on a small scale by a French medical commission, sent to Barcelona during the epidemic of 1821, erroneous views had been hastily adopted as to the spine being the *fons* and *origo mali* in yellow fever; but subsequently these opinions were admitted to have been entirely, or in part, erroneous, Magendie having shown that there is in the healthy state a certain quantity of fluid within the theca. O'Halloran mentions the effusion of coagulated blood on the sheath of the cord, for four inches in length, as it passes the lumbar vertebræ, and that the intervertebral substance was black and blue, as if from the effects of a contusion previous to death. The eye is described to be extremely hard, firm, and yellow externally.

The lesions within the cavity of the chest are not very remarkable, sometimes the pericardium contains an unnatural amount of fluid, of a pale yellow colour. The heart does not usually present any other appearance than is common in the muscular tissue generally. In the pulmonary tissue the changes observed are considered to be only accidental, though Dr. Browne says, that the lungs presented, almost always, numerous dark spots externally, or were nearly uniformly of a dark colour; and the infiltration of blood into their tissue, forming what is called splenization, was very frequent. The bronchial mucous membrane was often reddish, and coated with a copious sanguinolent frothy fluid; in other instances it was pale or yellowish, as was also that of the trachea. (*Edin. Med. and Surg. Journ.*, vol. xxxv.)

In the abdomen, the peritoneum and omentum are often slightly injected, and of a dirty yellow colour, without the usual natural glistening appearance. The coats of the œsophagus are softened and often partially eroded, especially towards its termination: it occasionally presents an appearance, as if some of the black vomit had been poured out from its surface, as well as from that of the stomach. This organ is usually distended by inodorous gases, and generally contains much of that peculiar dark-coloured fluid, the black vomit. Sometimes the contained fluid is pale and viscid, with flakes floating in it. Blood is occasionally effused upon its mucous surface, and sometimes small quantities are enveloped in flakes of a dirty ropy fluid. The vessels of this organ are generally gorged with blood, especially towards the cardiac orifice. The orifices of numerous canals may be seen, from which, by pressure, a dark fluid oozes, which is no doubt the *black vomit*. Dark patches of various extent and appearance are found around the cardiac orifice, with more or less of

punctuated redness in the large curvature: over the rest of its surface it is of a rose shade. Occasionally it exhibits an appearance as if a bit of the mucous coat had been pinched out, but there is very rarely softening, thinning, ulceration or gangrene. The small intestines participate, somewhat, in the lesions which are observable in the stomach. Externally they exhibit, to a greater or less extent, vascular arborizations, and are generally of a yellow tint; internally they contain a dark fluid, not unlike that which is found in the stomach; this in the lower intestines becomes of a thicker consistence; the villous surface is covered with a viscid mucus; and here and there, but especially in the duodenum, patches of a spotty redness may be observed. There is rarely, if ever, ulceration or disease of the glands of Peyer. The large intestines usually contain a quantity of pultaceous black matter. No particular changes, however, are discoverable in its mucous membrane.

The appearances presented, both externally and internally, by the liver, are very various: it is generally enlarged, heavy, and gorged with blood; often soft in texture, and easily ruptured. O'Halloran, however, describes it in several dissections to have been yellow and hard externally and internally, so destitute of blood and dried up, as it were, as literally to crumble beneath the fingers. Gillkrest mentions much the same appearance: he says, that on making deep incisions into its substance, little or no blood exuded; and when broken up between the fingers, the impression given was what is termed friability of texture. Scarcely any trace of bile is to be found throughout its pores. The gall bladder is sometimes empty and contracted, at other times distended with a grumous mass, like tar or molasses; sometimes it contains a minute quantity of orange-coloured bile, serum, or pus: its coats are usually very vascular. The biliary ducts are almost invariably pervious, with the exception of the cystic, which has occasionally been found closed. The spleen is usually increased in volume and softened. The kidneys are for the most part of a yellow colour: internally they exhibit signs of congestion, and, on minute examination, very small abscesses, of which the papillæ are the seat, may sometimes be discovered. The ureters very generally contain pus. The urinary bladder is usually contracted, and its coats thickened and hardened: its internal surface is covered with yellow mucus, and at times, its vessels towards the neck are surcharged with dark-coloured blood.

Though these different lesions are most usually met with after death from yellow fever, it must be borne in mind, that occasionally this disease proves so rapidly fatal, that few or none of them may be discovered. Under such circumstances there has not been time for their development.

Statistics. The mortality of yellow fever at times is frightful, and most uncontrollable. On the first appearance of an epidemic, nineteen out of twenty of those attacked die. Nevertheless, the number of deaths at this early period is not great in proportion to the whole population. As the epidemic progresses, the mortality becomes less in proportion to the number attacked, but greater in proportion to the population; and diminishes in both respects as the epidemic declines.

Individual liability to the disease is very much influenced by age, sex, constitution, and occupation. The susceptibility and mortality are greatest in youth and robust manhood: nearly half those attacked are between the ages of fifteen and forty-five. This may, in some respects, account for the dreadful mortality which has occasionally taken place among the troops and seamen sent to districts liable to the disease. On the other hand, children, old people, and persons of weakly constitution, frequently escape. According to Townsend, of 16 cases which occurred at New York 5 were betwixt the ages of 1 and 10; 17 betwixt 10 and 20; 40 betwixt 20 and 30; 40 betwixt 30 and 40; 36 betwixt 40 and 50; 15 betwixt 50 and 60; 6 betwixt 60 and 70; 2 betwixt 80 and 90. Of this number, six only were coloured persons, of whom three were blacks and three mulattoes. Of the whole number, fifty-nine were females; the mortality amongst whom, in reference to men, was as

one to three. From the above table it appears, that two thirds of the deaths occurred betwen the ages of 20 and 50; and that, of the remainder, nearly as many were under 20 as above 50: there were more than three times as many between 10 and 20, as between 1 and 10; and nearly twice as many between 50 and 60, as between 60 and 90. It is a little remarkable, that very nearly the same numbers died between the ages of 20 and 30, 30 and 40, and 40 and 50.

Females are not only less susceptible of the disease, but they are rarely attacked with the more severe forms: it is in them generally mild, unless during pregnancy, when it is almost invariably fatal.

With respect to constitution, persons of a plethoric habit are more liable to it than those of lax fibre. General observation has shown that Europeans, or those of northern latitudes, are, on their arrival in places where yellow fever is endemic, more susceptible of its influence than natives, which is an additional explanation of the excessive mortality among the troops sent out to such situations. The immunity from the disease enjoyed by the natives and residents of those climates is lost if they leave for a period and again return, as they are found to be equally subject to attack as the new settlers. The heat of the body in new comers to the West Indies, has been observed by Dr. M'Kittrick to be between three and four degrees higher than in the natives. This fact may, in some measure, account for the predisposition of newcomers to yellow fever.

With regard to occupation, bakers and cooks are particularly prone to severe attacks, while butchers, tanners, soap and candle-makers enjoy, in some degree, immunity: the same has been observed among those engaged in potash and soda works in New York.

Yellow fever may be said to be proper to places situate between 40° north and 20° south. It appears to require a climate in which the mean summer range is not less than 75°; and, according to some authors, 80°. Dr. Smith says, that temperature has evidently a more marked share in checking the disease than winds or rains, for that frequently, during an epidemic, storms have occurred without producing any perceptible effect; but the moment the temperature becomes reduced, the fever subsides, and in one night, sometimes, the generation of the febrific poison may be said to cease.

The history of many other places is also a proof of this. In the West India Islands it is rarely found to occur in the cooler climates, which the elevation of 1600 feet affords. At Stony Hill in Jamaica, which is 1300 feet above the level of the sea, and has a mean annual climate of 70°, this fever is only of occasional occurrence, and rarely epidemic. At the same time it does not follow that it occurs in all places which have a temperature ranging about 80°; or that in places where it is endemic, a year of peculiar heat necessarily gives it this epidemic character. On the contrary, the opposite is often the case, of which many striking instances might be quoted. It appears also, notwithstanding the statement of Dr. Smith just referred to, that the epidemic increases in a quiet state of the atmosphere; while, during the prevalence of gales, tornadoes, and other climatorial convulsions, this fever rarely prevails.

To enumerate the situations in which yellow fever occurs, would include almost the whole catalogue of places with a mean temperature of 75°, whose shores are washed by the seas between the latitudes we have mentioned. It is the devastating pestilence of the places which come within this scope in America, in the West Indies, in Europe, and in Africa.

Prognosis. In forming an opinion of the probable result of yellow fever, the character of the prevailing epidemic, the age, constitution, and residence of the patient should be taken into consideration. The symptoms which augur an unfavourable termination are, general depression supervening immediately on the attack, or occurring suddenly in the progress of the disease; an early yellowness, and especially an olive or dark tinge of the skin; coldness of the surface; weak irregular pulse; tendency to faint; deep sighing; constant vomit-

ing; small whitish stools; suppressed urine; tremors; subsultus tendinum; coma and singultus; red, injected, protuberant eyes; dilated pupils; offensive breath; petechiæ and vibices; and dark involuntary evacuations by urine and stool. The black vomit is generally a fatal sign, though many have survived this symptom.

The favourable symptoms are, the pulse maintaining a degree of strength after the third day; a soft skin of moderate temperature; the absence of vomiting, and of severe pain of the eyeballs; free perspirations; abundant secretion of high-coloured urine; bilious diarrhœa, especially if followed by quiet and refreshing sleep. The appearance of the cutaneous efflorescence, called *prickly heat*, is also favourable.

Though, speaking in general terms, these signs form sufficiently accurate grounds of prognosis, yet they are not always implicitly to be depended on: sometimes, when the worst consequences may be anticipated, a change takes place, which is followed by perfect recovery; at other times, when every thing appears favourable, some peculiar state suddenly ensues, which rapidly places the patient in danger.

Diagnosis. It would be almost impossible to describe, in a few words, any very particular or well-marked symptoms, by which yellow fever can be sufficiently distinguished from some of the diseases with which it is nearly allied, and may be confounded. In order fully to appreciate the differences between them, their whole phenomena should be studied. The statement of Mr. Amiel is very just, that this fever has no specific character, no appropriate, essential, or pathognomonic symptom, no definite duration; but that its prominent features are, pain in the head and loins; strong and quick pulse; turgidity of the vessels of the conjunctiva; moral and physical prostration; sensibility and irritability of the epigastric region; anxiety; dry red tongue; yellow tinge of the skin; great variation in the urinary secretion; passive hæmorrhage from the nose, tongue, gums, and bowels; dark or even black vomitings or dejections; delirium, coma, &c. The whole or part of these symptoms appearing together, form the most sure diagnostic of this fever.

We have previously referred to the opinion which has been entertained, that distinct remissions are a part of the phenomena attendant on this disease. In consequence of this, Dr. Pinckard and many others regard yellow fever to be not a distinct or specific disease, but merely an aggravated degree of the common remittent or bilious fever of hot climates, rendered irregular in form, and augmented in malignity, from its occurring in persons unaccustomed to the climate. In this view they think they are especially supported by its exhibiting so great instability and variation of character. We have however previously shown, that there is every reason to conclude, that yellow fever is not attended by a perfect and distinct remission; and that, although many conceive it to be more nearly allied to the remittent than to any other type of fever, it is in the absence of remittence the chief difference consists. Dr. Stevens states as a diagnostic distinction, that in remittent fever the blood, when drawn at the commencement of the attack, is both buffed and cupped, which is not the case in yellow fever; that in this latter, though there may be a very low state of the temperature of the body, there is never any rigor; that the patients do not shake nor tremble like those who are under the influence of the marsh poison; and that there is an expression of the countenance which is peculiar to it; which, though not so marked as the expression in tetanus, is yet so distinct, that those who have once seen it can easily recognise it. It may be distinguished from plague by its existence in a temperature which puts a stop to the progress of this disease by the non-appearance of buboes or carbuncular eruptions, and by its being always ushered in by a violent febrile paroxysm, which is not usually the case in plague. From typhus it may be known by its not occurring in cold weather; by its attacking the young and robust; by the yellowness of the skin; pain of eyeballs, &c.; and by its occasional termination in intermittent and remittent diseases.

Nature. Very different opinions are entertained respecting the nature of yellow fever. Some, with Tomasini, Pringle, Lind, Moseley, Pinel, Rubini, and others, maintain that it is a general pyrexia, complicated with inflammation of the liver and internal surface of the stomach and intestines. Bailly and Bancroft associate it with typhus fever, and ascribe the fatal cases to lesions of the brain and stomach. Others regard it as a variety of remittent fever. With few exceptions, however, it is now viewed as a specific disease; and, as such, its proximate cause, or essential nature, has given rise to much discussion—some referring it to lesion of the solids, others to disorganisation of the fluids.

With some slight modifications, Broussais, Dubreuil, and Boisseau, regard the phenomena of the disease as the sequel of a primary inflammation, of the gastro-intestinal inflammation. Dr. Wilson (*Memoirs of West Indian Fever*), who says that there is a want of consent between the power of the disease and its external manifestations, maintains that it is owing to the presence of a peculiar morbid affection of the alimentary canal; others attribute it to disorder primarily taking place in portions of the nervous system—the brain and spinal column, according to M. François and Boyle. Dr. Gillkrest says, that the uniform integrity of the cerebral functions in the first stages of this malady, as observed at Gibraltar in 1828, and as noticed on other occasions, the extremely frequent integrity of these functions to almost the last moments of existence in its congestive or more intense and fearful form, together with the remarkable manner in which the secretions are often suspended, induce him to think that the ganglionic system is involved very prominently in the series of morbid actions. Dr. Craigie attributes the phenomena to a general affection of the capillary vessels, which is an application to this disease of the views he entertains of fevers generally. The chief advocates of the theory, that yellow fever originates in disorder of the fluids, are Guyon, De Fermon, and Dr. Stevens. The latter states, that the disease is caused by an animal poison which remains dormant in the system about four days, during which it effects certain changes in the blood, which unfit that fluid for nourishing the system. Not only does it become darker in colour but altered in composition, as is evident from its having, when first drawn, a peculiar smell, and its almost invariably coagulating without a crust; from the appearance of black spots on the surface of the crassamentum, by the coagulum being soft and easily separated, and by a large quantity of black colouring matter falling during its formation, to the bottom. Moreover, when the serum separates, it has generally a yellow, in some cases a deep orange colour. He says that these derangements are often so apparent, that in some instances, where the individuals have been accidentally bled, he has been able to foretell an attack of fever, merely from the appearance of the blood which had been drawn previous to the commencement of the cold stage. The intermixture of the poison with the blood (Dr. Stevens supposes) causes a deficiency in its saline constituents; the results of which are, that in the early stage of the disease the structure of the red globules becomes deranged, so that they do not separate freely and entirely from the serum, but are partially dissolved in it, while in the advanced state they become entirely black, and the whole mass of blood thin and poor. This state is evinced during life by the oozing of black fluid blood from the tongue, eyes, skin, or other surfaces, and by the condition of the blood in the dead body. With regard to the change of colour in the blood, Dr. Stevens states, that in the commencement of the fever, it is dark from the effect of the poison; and that in the last stage it appears to be black merely from the loss of its saline matter*: for when we

* As these statements involve the accuracy of many of the received views and opinions on the arterialisation of the blood, Dr. Turner made a series of experiments, from which he says, that he is at a loss to draw any other inference than the following:— That the florid colour of the blood is not due to oxygen, but, as Dr. Stevens assumes, to the saline particles of the serum. The change from venous to arterial blood appears, contrary to the received doctrine, to consist of two parts, essentially distinct; one is a chemical change essential to life, accompanied by the

add any of the natural saline ingredients to the black fluid which is taken from the body late in the disease, it becomes florid, and more healthy in appearance than when the saline matter is added to the poisoned blood drawn from the system before the attack: He therefore thinks it probable that the greater part of the poison is either changed in its properties during the disease, or thrown out of the system in its original form by the secreting organs. This morbid condition of the blood he concludes to be the first link in the chain of those phenomena which constitute fever; for, as this pernicious blood circulates, it acts on every fibre and on every tissue of the living system, disturbs every function of the body, and deranges every faculty of the mind, while all the excretions have a morbid appearance, and the secreted fluids are changed both in quality and quantity.

Causes. The opinions which are entertained respecting the causes of yellow fever may be arranged under three heads: — 1. That it is a disease essentially of endemic origin; 2. That, being of endemic origin originally, it becomes contagious; 3. That it is solely and essentially induced by contagion. Those who entertain the first view are by no means unanimous as to the nature of the endemic cause to which they attribute the origin of this fever. Almost every possible physical condition has in its turn been thought to be the true one. Marsh miasm has been very generally regarded as the origin of yellow fever. Dr. Bancroft, who is one of the most able writers on the subject, says, that those whose minds are unbiassed will clearly recognise in this disease all the peculiar features and characteristic marks by which marsh fevers are distinguished in all parts of the world; and they will naturally conclude that, though it be the most aggravated and violent of the fevers arising from miasmata, this aggravation and violence are produced only by a greater concentration or virulence in the latter, joined to a greater intensity of atmospherical heat, acting on persons but little accustomed to bear it, whilst they retain the excitability of cold or temperate climates, together with an habitual disposition to generate that portion of animal heat which such climates require. In this opinion he coincides with Dr. Rush, who says that we might as well distinguish the rain which falls in gentle showers in Great Britain, from that which is poured in torrents from the clouds in the West Indies, by different names and qualities, as impose specific names and characters upon the different states of bilious or marsh fevers. Without entering again into the question of the identity of these diseases, there can be no doubt that yellow fever, in common with fevers whose origin is undoubtedly due to marsh miasmata, often assumes a peculiar virulence of character in situations which are favourable to these latter; and that it is in such situations in hot climates where malaria are prevalent, as at the estuaries of rivers and the shelving shores of the sea, that yellow fever is most usually met with; and that it occurs both sporadically and epidemically in the same seasons, in which experience has taught us malaria give rise to intermittent fevers. Opposed however to the view, that yellow fever is owing to marsh exhalation, are the facts, that it very frequently prevails where no cause of this kind can be traced to be in operation; and that marshes often abound in hot latitudes without the disease occurring in the neighbourhood. Numerous instances have been brought forward to show that it prevails where there is no marsh exhalation. Its occurrence on shipboard without there being the least possibility of tracing the presence of marsh vapours to the ships themselves, or to the places near to which the vessels are moored, has been particularly dwelt on. Bancroft endeavoured to show, that in these cases it was owing to decomposition taking place in the ballast, or to the putrid state of the bilge-water. Subsequently to these views having been expressed, the possibility of the first has been obviated by the adoption of iron

absorption of oxygen and evolution of carbonic acid; and the other depends on the saline matter of the blood, which gives a florid tint to the colouring matter, after it has been modified by the action of oxygen.

ballast, and of the second by the frequent changing of the water, yet the fever has equally prevailed. At Barbadoes the physical characters of the island are such as to preclude entirely the idea of the existence of marsh exhalation; besides which, from its having been for a long period in a state of the highest and most complete cultivation, it is trenched, drained, and cleansed, and has undergone all those improvements which render a territory, as far as possible, free from marsh exhalation. Corresponding with these peculiarities of its physical structure is the fact, that none of the modifications of ague are endemic in Barbadoes. Yet yellow fever has been at all times, and still continues to afflict the population of this island in the severest forms of the disease.

With regard to the second point, that it does not occur in situations where marshes abound, Dr. Wilson (*Edin. Med. and Surg. Journ.*, vol. xxxv.) quotes the very strong case of its not being a disease of Rio Janeiro, and contrasts it with its prevalence at Vera Cruz,—both under nearly equal parallels of latitude; both built on a low sea-shore ground, skirted by high mountains, though at unequal distances; the religion of the inhabitants the same, and their habits and modes of life very similar. Yet, while Vera Cruz, without a rood of marshy soil, is a hotbed of West Indian fever in its most violent forms, in Rio Janeiro, though situated near an extensive swamp, and liable to ague, yellow fever is never known. In Honduras also, which is situated close to the sea, and occupies part of a large bog, and is during the rainy season so perfect a lake that teal and snipe may be shot from the windows, while in dry weather it becomes so parched that the inhabitants have difficulty in procuring water, though the inhabitants suffer much from intermittent and remittent fevers, the yellow fever is comparatively unknown. The same immunity is enjoyed by Demerara, which settlement is a narrow tract, low, level, extending along the sea-coast, and intersected with canals and ditches, alternately inundated and covered with stagnating oozy water abounding with vegetable matter. Here the soil is a swamp, and the ditches are marshes: nevertheless, the yellow fever is an exceedingly rare disease.

Its origin has by others been attributed to intense solar heat, acting either *per se*, or on wet and marshy coasts. Sir Gilbert Blane, as previously mentioned, states that yellow fever never occurs either in tropical or temperate latitudes, unless the temperature has for some time been steadily at or above 80°. It is a matter of general observation, that an elevated temperature almost invariably accompanies the development of this disease; and that near those low situations in which it occurs, places, which are on a higher level, and the temperature of which is consequently colder, are not subject to it. Drs. Ferguson and Lind appear both, with certain modifications, to entertain this view of its origin. The former states this disease to be owing to a desiccation by heat, provided its operation be not disturbed by wind, &c.: the latter, when defining what unhealthy climates are, says, that in such places, during excessive heats and great calms, it is not altogether uncommon, especially for such Europeans as are of a gross habit of body, to be seized at once with the most alarming and fatal symptoms of what is called the yellow fever, without having any previous complaint, sickness, or other premonitory symptoms of the disease. Opposed to this theory, on the other hand, the names of many places may be adduced, in which, though having a temperature, according to his view, adequate to produce the disease, it does not occur. This, to say the least of it, invalidates the opinion that it is solely owing to an elevated temperature; and accordingly we find Dr. Wilson dismissing it very summarily, stating that the circumstance of yellow fever never having been seen in situations, as Kingstown in Canada, Moscow, and various places in Russia, in which the atmospheric temperature is equally high during summer, as in places noted for the prevalence of that disease, affords a satisfactory proof that the cause assumed is insufficient to produce the effect. Dr. Craigie, who quotes many instances of the same nature, says, they are quite sufficient to

prove, that the highest degrees of atmospherical or terrestrial temperature are not necessarily conjoined with the production of yellow fever; and that, though this disease requires a temperature of 74° or 75° for its production, its continuance is quite independent of this temperature; and that it irresistibly results, that high temperature, or intense and continued atmospherical heat, is not the most essential generating cause of yellow fever, but that the concurrence of some other circumstances is required. It appears, in short, that elevated temperature is merely one of many coexisting circumstances which concur at the period of yellow fever epidemics.

Others again, and of these the chief is Dr. Miller of New York, state that yellow fever is generated by the impure air or vapour which issues from the new made earth or ground raised on the muddy and filthy bottoms of rivers, and which deteriorates the air above it. Consequently this fever is found to rage chiefly where large quantities of new ground have been made by banking out the rivers for the purpose of constructing wharfs; and that its great prevalence in New York and Philadelphia is owing to the shores of their several rivers having undergone great and rapid alteration for this purpose. It is obvious, however; that this is not a constant condition of the origin of yellow fever; and though many of the places which are peculiarly subject to this disease have a sea-coast which is loaded with alluvial mud, yet in many others where it occurs there is nothing presented but a firm rocky shore. The same objection may be made to many other statements of its origin, as the principle of vegetation, the elementary decomposition of vegetable substances, damaged coffee, &c. Dr. Wilson (in his *Memoir*, published in 1827) endeavoured to show that this disease is caused by the gaseous product neither of vegetable nor herbaceous matter, but of trees, shrubs, or any sort of wood in a state of decomposition. This view he has very ingeniously applied both to its occurrence at sea and on shore. Dr. Wilson, to say the least of it, has placed his different facts and arguments in an order so clear and forcible, that his theory assumes on the whole an imposing and persuasive aspect. Its occurrence in the Caribbean Islands and other places, where there is apparently a difficulty on these grounds of accounting for it, he attributes to a specific decomposition taking place amidst the vast coral reefs, which, from their texture being porous, loose, and traversed with crevices, form at all times a never-failing receptacle for every species of decayed wood, leaves, &c. In other places he thinks the mangoe tree in a state of decay is the immediate source of the peculiar exhalation.

The origin and progress of yellow fever on shipboard has ever been a perplexing point. In accordance with his theory, Dr. Wilson accounts for it by supposing, that the wood forming the interior of the holds of ships undergoes, in tropical climates, a great change, during which some of its constituent principles suffer decomposition, and pass off in a gaseous form. This change is manifested by the wood becoming dark; by its shrinking and becoming denser in structure, and at the same time losing weight; in short, by seeming to be partly charred. The extent to which this process is carried, and the nature of its results, are modified by the previous condition of the wood, by the degree of heat, and probably by the interior arrangements of individual ships. In a vessel newly built, arriving in the West Indies in the hottest season of the year, remaining for weeks in harbour, with the hold cleared and heated by stoves, the process is speedily completed. According to Dr. Wilson, fever in such circumstances appears early and spreads rapidly; but when once it ceases it does not again return. In a vessel, on the contrary, which arrives in the cool season, is much at sea, and its hold not dried by stoves, the process of decomposition is slow and imperfect, and may never be completed. In such a vessel, fever will never be severe and very fatal, but it will often recur and produce sickliness and death till the last day of its continuance on the station.

Amiel says, that it appears evident to him that the occurrence of the yellow fever epidemics is the result of atmospherical vitiation, from the fact of the

disease having been constantly influenced by atmospheric circumstances. They have a fixed period for their appearance, a fixed period in which they attain their maximum mortality, and a fixed period for their termination. Dr. Craigie says, the only mode in which he conceives all these discordant statements can be reconciled, is by supposing yellow fever to be a disease proceeding not from the influence of terrestrial miasmata, or mere local peculiarities alone, but from atmospheric peculiarities entirely; which, however, operate much more directly and forcibly in situations favourable to the production of terrestrial emanations. While ague is the offspring of the marsh and its margins, and remittent is the effect of a more concentrated form of the same exhalation from any moist surface in the process of solar desiccation, yellow fever appears to be the exclusive product of that state of the atmosphere which takes place after a long continuance of solar heat with little or no wind, in those points chiefly where the atmosphere of the sea and that of the land are in constant communication and interchange.

Those who entertain the view, that yellow fever is a contagious disease, are divided in their opinions, the one party holding that it is at all times essentially and absolutely the result of contagion; that it differs entirely from endemic fever; never proceeds from it, and never passes into it. The other party entertain the view, that the same causes which produce endemic fever may, by the superaddition of a contagious property generated in the subjects of the disease, give rise to another form propagated only by contagion. Dr. Stevens, who advocates the former view, says, that in the African typhus, as well as in that new disease, the dandy fever, we must either shut our eyes against the most positive evidence, or admit that contagion is the sole cause of both these fevers; the proofs of this which he has witnessed are, to his mind, just as strong as those in favour of the contagious character of either small-pox, scarlatina, or any other disease acknowledged to be contagious. A host of evidence may, however, be produced against these views; but as the facts and arguments are much the same as those which have been detailed as bearing upon the question of contagion in Plague, it is unnecessary to enter fully upon the subject here. We must not, however, pass over some of the observations which have been made by Dr. Chervin, who has for years most industriously and strenuously opposed the doctrine of contagion as applied to yellow fever in particular. After showing that the statements which are made of the importation of yellow fever into Barbadoes by the ship Hankey, which are particularly dwelt upon by Chisholm as evidence of contagion, are any thing but correct or conclusive; and after having generally exposed the weakness and insufficiency of the facts and arguments of the contagionists, he adduces the following reasons for the conclusion, that yellow fever is not contagious:— 1. Although it has been the constant practice of the inhabitants of towns in the United States to flee to the country as soon as the disease appears, and for those who are attacked to be conveyed to the abodes of their families, yet in no instance has the yellow fever been propagated out of the towns, or in the interior of the country thus communicated with. 2. That in hospitals devoted to yellow fever patients, the attendants of every class have been invariably exempt from the disease, when these establishments are situated beyond the source of the sickness, and if the attendants did not expose themselves to it. 3. That though according to the hypothesis of contagion, it might be imagined that persons frequently approaching patients within the range of infection are more liable to contract the disease than those at a distance and not communicating with them, yet this is not the case. 4. That in fact the nearest communication with the bodies of the diseased, the inoculating with the blood of persons so affected, the drinking the black vomit, &c. has not propagated the disease. 5. That the apparel used by patients has appeared to be equally inoffensive as their persons and corpses; and that separation and seclusion of the healthy from the sick, and the prohibition of all intercourse, direct or indirect, has entirely failed in preventing its occurrence.

In order to prove the agency of contagion, a condition is absolutely necessary, which hitherto has never been properly attended to, viz. that the persons to whom the disease has been supposed to be communicable, should not reside in the same situation or locality as those by whom it is believed to be communicated, as in such case their being subject to the same influences as those already diseased, entirely invalidates any argument that may be offered in support of the operation of contagion.

In the absence of such satisfactory evidence in its favour, we think that, amid all the conflicting histories of the etiology of this disease, we are justified in stating the following to be fair conclusions in respect to its origin:— 1. That yellow fever is not contagious, either primarily or contingently; 2. That it is essentially and solely of endemic origin; 3. That it is difficult to state decidedly, what are the local causes which produce it: but most probably they are atmospherical: and as the disease is found only to occur on or near to the sea-shore, that most probably a climate which is modified by the sea forms a necessary condition.

The only satisfactory way of ascertaining what local and essential conditions are necessary to produce yellow fever, would be to investigate in such places where it is usually endemic, as at Vera Cruz, the west coast of Africa, &c. what those peculiar states are, both in respect to climate, physiognomy, &c. which do not obtain in other places in the immediate neighbourhood, and where the disease does not occur. This, however, can not be expected to be accomplished, until medical topography has been more carefully and extensively attended to than has hitherto been the case.

Though the *predisposing* causes of yellow fever are very numerous, a few words only are necessary. That which requires most particular mention is, the powerful influence exercised by the coming of a stranger uninitiated to the climate where it occurs endemically. Beside this may be enumerated, the ordinary causes which in other places predispose to fever generally, such as intemperance, excessive venery, prolonged study, manual labour under circumstances of great fatigue, especially if carried on in the heat of the sun, checked perspiration, sleeping exposed to the night dews. From what has just been said upon the causes of this fever it may be well-understood that we should not be inclined to estimate amongst its preventives the system of separation entailed by the quarantine laws with their train of hardships and inconveniences. The means of prevention consist rather in retiring, on the occurrence of yellow fever in an epidemic form, to the neighbouring high lands, or to some distance inland; in ventilating the houses, and in avoiding the predisposing causes of fever generally. Mr. Wallace says, that one essential point is to preserve, as far as we can, the natural energy of the system; which is best done by giving to the body regular sleep, adequate exercise, a moderately nourishing diet, and to the mind a proper degree of recreation and employment. As much as possible means should also be taken to protect the system from the morbid influence of the atmosphere, by being within doors by nightfall, by keeping the windows closed during the night, and by having fires in the rooms so as to prevent a stagnation of air. Experience has shown, that very little reliance is to be placed upon the disinfecting mixtures that have been proposed with the view of altering the constitution of the atmosphere, and by this means destroying the malaria which may exist in it.

Treatment. From a review of the symptoms, the indications of treatment are, 1st. To subdue the inflammatory and irritative state of the system, and if possible to prevent the supervention of local congestion or inflammation; 2. To prevent the system sinking into a state of collapse; 3. When the inflammatory state is subdued to sustain the powers of the system. The modes that have been suggested to carry out these may be resolved into, 1. The *antiphlogistic*, which is by bleeding, both general and local, purging, &c.; 2. The *mercurial* (which in some measure is a branch of the first), in which the chief reliance is to be placed upon ptyalism induced by the free administra-

tion of mercury; 3. The *stimulating*, in which bark, port wine, &c. are freely employed; 4. A plan of treatment in which all these modes are conjoined, ptyalism in addition to the antiphlogistic being first resorted to, and followed by the stimulating. This mixed treatment is founded upon the view, that yellow fever is primarily an inflammatory disease, becoming putrid in its progress.

1. Dr. Rush, who particularly condemns the two latter modes of treatment, is one of the most strenuous advocates for the antiphlogistic, recommending that it should be pursued to a very vigorous extent. When speaking of bloodletting he says, that though in some cases moderate bleedings may be sufficient, yet, that generally it is required to be done very often, and to the abstraction of large quantities. Moseley says, that the intention of bleeding can be answered only by performing it immediately, and in the most extensive manner, which the high state of inflammation and the rapid progress of the disease demand: taking away only six or eight ounces of blood, because the patient may be faint, which is a symptom of the disease, is doing nothing towards a cure. Bleeding must be immediately performed and repeated every six or eight hours, or whenever the exacerbations come on, while the heat, fullness of pulse, and pains continue; and if these symptoms be violent and obstinate, and do not abate during the first thirty-six or forty-eight hours of the fever, bleeding must be executed *usque ad animi deliquium.* Bancroft thinks, that in order to avoid the mischiefs arising from the superadded violence of the disease, no means are so certain or beneficial as bleeding; but that it may prove advantageous, it ought to be performed copiously, and from a large orifice, as early as possible after the inflammatory action is developed. Jackson also adds his testimony, that the abstraction of blood in large quantities is a most decisive process. Dr. Hector M'Lean says, that his experience confirmed its utility, and that his practice was much more successful after he had adopted bloodletting than before. He is not, however, an advocate for its employment after the first or second day; after the third, he decidedly condemns it. Sir W. Burnett became so convinced of the absolute necessity of the free abstraction of blood, that he issued orders to the surgeons of the fleet, when stationed in the Mediterranean, to the effect, that they should pursue this practice in every case of yellow fever that came under their inspection. He recommends it to be employed both generally and locally, in order to remove the affection of the brain; on accomplishing which, he says, depends all subsequent success, and which being removed, generally prevents the dangerous symptoms of the after stages. These operations, he adds, must be repeated according to the urgency of the symptoms; and though it will often happen, after a few ounces of blood have flowed, that syncope is induced, yet this must not prevent the repetition of the bleeding: in the course of an hour the bloodletting may generally be repeated, and thirty or forty ounces taken away without producing it. He further says, that blood has often been taken to the amount of 130 or 140 ounces, and even as far as 200, with the most marked advantage. On the other hand we found nearly all the practitioners in the West Indies, and many of the American and Spanish physicians, condemning the use of the lancet as strongly as those just mentioned have recommended it. But as their opinions merely amount to a denial of its efficacy, or to some strong statement, that those who may pursue such a practice are "guilty of nothing short of murder," or "are chargeable with their patient's death," we shall not particularly dwell upon them. It appears evident, however, from the experience of Chisholm, Townsend, Musgrave, Amiel, and others, that bloodletting carried to any very great extent, or after the first inflammatory stage of the fever has subsided, is decidedly injurious. Though it may be very beneficially pursued on the first commencing of the disease, its repetition in all cases is, to say the least of it, hazardous.

Mr Wallace has placed the whole subject in a fair and judicious point of view, when he says that, as a general rule, bloodletting is inadmissible; but that to this rule there may be many exceptions. If the patient be decidedly

labouring under inflammatory disease; if the arteries are beating strongly, with the skin parched and burning, the headach acute, and all or the chief of those symptoms which constitute synochal fever be present, there can not be a doubt as to the propriety of having immediate recourse to bloodletting. (*Edin. Med. Surg. Journ.*, vol. xlvi.) There is indeed no other remedy to which we can look, in such cases, for any thing like immediate and decided advantage; and therefore it is indispensably necessary, not only to have recourse to it early, but to carry it to the requisite extent. It will not do to measure the quantity of blood, or to settle beforehand the number of ounces we may with propriety take away; but we are to look to the character of the disease and to the strength of the patient; and so long as the latter will bear further reduction, and the former is evidently continuing its course, so long will it be necessary for us to proceed with the remedy. But supposing the fever to have a somewhat different character; the pulse, though tolerably full, to be easily compressed; the heat of surface moderate; the headach accompanied with a slight degree of stupor, with that degree of anxiety which indicates as much of nervous as of vascular derangement, then, although bloodletting may still be admissible, nay, perhaps indispensable, it is necessary to weigh carefully these two very important questions: — 1. Whether general bloodletting ought to be had recourse to at all? and, 2. To what extent it should be carried? And again, if the disease have still a different character; if the strength of the artery, instead of being increased, be diminished; the surface cold and slightly clammy; the patient nearly heedless of what is passing around him; and all the energies, mental and corporeal, depressed in an extraordinary degree, under such circumstances, if bloodletting be not altogether proscribed, it will at least be but seldom admissible: and indeed nature herself, by obstinately refusing to yield the blood, often at once points out the impropriety of the practice, and effectually prevents its being carried into effect. In addition to general bleeding, if there be any very prominent symptoms of local congestion or inflammation, topical bleeding may be resorted to. Depletion by leeches or cupping has been found materially to contribute towards relieving headach and checking the incipient gastric symptoms.

In addition to bloodletting thus judiciously employed, the exhibition of purgative medicines has been very generally approved. Nevertheless, there has been some contrariety of opinion expressed as to their selection. Rush and some others have administered them to a very great extent, in doses for instance of fifteen grains of jalap and ten of calomel, every two or three hours. Hillary, Hume, and Cleney, who do not approve of this severe treatment, recommend the administering of much milder medicines, such as manna with cream of tartar, sulphate of potash, rhubarb, &c. Dr. Bancroft, who states that it is particularly necessary to obviate the tendency to accumulation of the alimentary contents, as they are in great measure the source of the morbid irritability of the whole intestinal canal, and more especially of the stomach, recommends that such medicines should be employed as will not offend and irritate the stomach by their bulk or quality. There can be no doubt that when this organ is not in a state of too great irritability, that the administration of mild but efficient purgatives is of the most essential service; it is, in fact, a practice which should by no means be omitted. As there is very often, however, so much irritability of the stomach as to render it almost impossible for any of the purgatives in ordinary use to be retained, the previous administration of small doses of opium, or the combination of opium with the purgative, should be resorted to; and in case of their not succeeding, warm emollient and purgative clysters should be freely administered, until free evacuation of the bowels be procured, after which irritation of the stomach is generally allayed. Mr. Tegart has the merit of proposing the exhibition of the croton oil, not only in these cases of excessive irritability, but generally. He says, that a drop or two placed upon the tongue almost immediately excites the bowels to action, without adding to the irritability of the stomach. Mr. Hacket, who attributes

much of the success of his practice at Trinidad to the use of this medicine, both by mouth and by clyster, says that the power which it has of allaying gastric irritability and general nervous excitement, as well as restoring the circulation to the surface, and thus relieving the internal congestion, is extraordinary; and though it may seem for the moment, when first given, to increase the irritability, yet, after a little time, it hardly ever fails to produce the desired end.

The prompt administration of emetics has by many been strongly recommended, but more especially by Arejula, one of the first authorities in the treatment of yellow fever. They are condemned, however, by most practitioners, and we think with justice; for, as Bancroft observes, in place of allaying nausea they have rather a tendency to excite the irritability of the stomach, which we have just shown is an object particularly to be subdued and guarded against.

Cold affusion has been recommended. Some indeed state, that if employed on the first commencement of the disease, it very frequently succeeds in cutting it short entirely. Without however anticipating so happy a result, there can be no doubt that this remedy, judiciously applied, is most salutary. Its immediate effect appears to be that of lowering the temperature, soothing the general irritability, inducing sleep, and recruiting the powers Should the disease, however, have passed into a stage of collapse, this remedy, unless carefully employed, may be attended by very unpleasant results. Under such circumstances aspersion, or slight sponging, may be resorted to, administering, at the same time, nourishment and cordials. The general rule to be observed in the use of cold bathing is, that it be resorted to as long as the heat of the body is above the natural standard; and that, when the temperature is depressed, it should be omitted. Under some circumstances the warm bath has been also recommended; and Jackson has combined its employment with the use of the cold affusion. According to the experience of most practitioners, this treatment is followed by very questionable success.

In addition to the antiphlogistic means above detailed, the use of diaphoretics has been much recommended. Amongst these the acetate of ammonia, James's powder, Dover's powder, &c. have been particularly employed. Drinking small quantities of cold water has also been particularly advised: a liberal use of it has been found not only to determine to the skin, but to moderate the heat of surface, as well as to allay the general febrile state. Dr. Bancroft, though approving of this administration of cold water, and speaking of its effects, is yet opposed to the exhibition of the medicines that act upon the skin. He says, that though they have been frequently employed in the treatment of yellow fever, yet he cannot join in their commendation, because they tend to increase that disposition to vomit from which the greatest danger is always to be apprehended; and that of this class none are so detrimental as the preparations of antimony, for they usually leave behind them an extreme degree of irritability in the primæ viæ, which too often resists all our endeavours to control it. In addition to the above means, the advocates of the antiphlogistic plan recommend the occasional use of epispastics and blisters: they have been recommended with the view of being useful as general and local revulsions; and it is on this principle that Dr. Linton has suggested their application to the spine, which has been often found to allay very singularly the irritation of the stomach. Dr. Gillkrest suggests, in the hope of affording some palliation of the incessant vomiting, often so very distressing in yellow fever, the use of dry cupping on the epigastrium, as practised by ancient physicians in their endeavour to relieve the vomiting in malignant cholera.

2. The mercurial treatment has had its warm advocates as well as opposers. Chisholm, after thirty years' employment of it, views it as a sheet anchor, but thinks that salivation is a necessary condition. This is likewise the opinion of Dr. Rush and many others. Many have also recommended in addition to the free internal administration of this remedy, that its effect should be accelerated

by its external application. Bancroft, Dalmas, Stephens, and many others, do not however entirely approve of this practice. The former says, that previous doubts as to its efficacy have not been removed by subsequent experience; and that at any rate it appears certain, the good effects of the mercurial treatment have been greatly exaggerated: at the same time he cannot go quite so far as Dr. Grant, who avers that, although he has been called in to attend many under such circumstances, *not one* survived, and that they became victims to the mercury rather than to the fever. We think Dr. Bancroft's observation on the use of the mercurial frictions very just: he says that they do not seem likely to prove altogether innocent in those cases in which they may happen to do no good; for, besides the salivation which they may produce, when the patient lives long enough, and which is to be added to the number of his sufferings already sufficiently abundant, the very act of rubbing on the mercury tends greatly to disturb both body and mind when his only wish is to remain unmolested; while the covering a large portion of the skin with a greasy ointment produces a considerable accumulation of heat therein, by which the general temperature of the body, and with it many of the other febrile symptoms, may be increased. There can however be no doubt, that the administration of mercury, except in the mildest cases, which will be found to give way to more gentle and simple means, is often attended by beneficial results: but at the same time the propriety of invariably pushing its exhibition to a state of salivation may be very much questioned; we are inclined to think, the chances of recovery, under such circumstances, would be rather diminished than otherwise, especially if collapse should intervene.

3. Though the mode of treatment by stimulating and tonic medicines has found some advocates, it has been so almost universally condemned, that Dr. Gillkrest is fully justified in saying, it seems quite impossible to explain how, up to the time of his death, large doses of *the bark* should have merited the special favour of Dr. Lafuente, one of the principal physicians connected with the epidemics of Andalusia during some of the first years of the present century.

4. After a careful review of all that is known on the nature of Yellow Fever, it appears that the treatment which comprehends the occasional application of the above plans, modified by the symptoms which arise during the progress of the disease, is not only the most philosophical, but has proved by experience to be the most successful.

Before concluding, we may mention that a variety of remedies, as opium, ether, limewater, &c. have been applauded by some as exceedingly efficacious, and by others condemned as injurious in the extreme. The discussion of the relative merits of these, however, would occupy the time of the reader unprofitably; we forbear entering upon the subject: we must not, however, omit to mention the plan of treatment which has been specially recommended by Dr. Stevens. His theory of the nature of yellow fever has already been alluded to. Upon this he founds a system of treatment, which consists in the free administration of saline medicines. He says, that when proper saline remedies (by which he means those which are not purgative) are used, they do not fret the stomach; they act on the intestines as much as is necessary; they keep up all the secretions, particularly that of the kidneys; and enough is absorbed to enter the circulation and prevent the dissolution of the blood, and preserve it until the fever abates and all the danger is past.

INFANTILE GASTRIC REMITTENT FEVER.

Division into the acute and the chronic forms. — Symptoms and complications of the acute form.— Causes. — Diagnosis. — Treatment. — Symptoms of the chronic form.— Complications.— Treatment.

Many of the names by which this disorder of children has been at various times known, have been applied either from some supposed cause of the symptoms, or from some prominent characteristic of the disease itself. Thus it has been called *the worm fever* — *the mesenteric fever* — *the stomach fever* — *the low fever of children* — *the infantile hectic* — *the infantile remittent fever.* On a careful examination of the history and symptoms, as given by various authors of former and recent times, we are satisfied that much confusion has arisen, sometimes from imperfect attempts to separate into distinct diseases what are in fact but early and later stages of the same, and on the other hand, from an opposite error of confounding what are accidental complications, with what may be considered as the regular and simple form of the complaint. There is apparently a striking confirmation of the modern doctrines of Broussais as to the nature of fever, in the acknowledged cause of this infantile disease. The most prominent symptoms are referred to the mucous lining of the stomach and intestines; an acute or a protracted form of fever is the result; and with an improved condition of the alimentary canal the febrile paroxysms are mitigated and gradually disappear. In the various forms of continued fever there is so much diversity in the complications of local lesions, as well as in different seasons, and in different epidemics, as materially to detract from the soundness of, if not to disprove, the doctrines of this celebrated pathologist. In the fever under consideration, however, no such diversity exists. The description given by the first distinct writer on the subject, Dr. Butter of Derby, in 1782, agrees in all essential points with that published twenty-four years afterwards by Dr. Pemberton, the accuracy of which is admitted by the most recent writers and practitioners. Dr. Butter in his work on *Infantile Remittent Fever*, has divided the disease into the *acute*, the *slow*, and the *low* form. Dr. Underwood, who published the first edition of his work on *Diseases of Children*, two years after Dr. Butter's treatise appeared, gives the name of infantile remittent only to the very mildest form of the complaint, and devotes but a very short chapter to what he considers a fever, " remarkable for being always devoid of danger." In alluding to Dr. Butter's recently published work, he clearly considers that he has exaggerated the importance and severity of the disease. But Underwood proceeds to describe in subsequent chapters, the *typhus* or low fever, and the *hectic*, which are evidently identical with the *low* and the *slow* forms of Butter.

For practical purposes we are of opinion that the division into the *acute* and the *chronic* will be sufficient; and that in describing these two forms there will be ample opportunity to notice all the necessary details, whilst the arrangement will be much simplified.

1. *Symptoms of the acute form.* It is not in earliest infancy that this disease is most commonly met with — indeed, many have denied its existence in children during the period of lactation. It is most frequent from the age of two to six, but preserves its peculiar character up to the age of puberty, though, the older the child grows, the less marked are those peculiarities of type. In the *acute* form, the symptoms often come on very suddenly. The child perhaps goes to bed apparently as well as usual, and in an hour is found with a burning skin, a flushed countenance, an injected eye, and a very rapid pulse, varying perhaps from 120 to 160. There is intense thirst, with a dry tongue, which soon becomes coated and covered with a thick white fur; the child is

restless and wide awake, often delirious, but able to answer questions or do as directed. If old enough, the child often complains of pain in the head and sometimes in the abdomen, the parietes of which are generally more hot than any other part of the body; indeed, the feet are often cool or cold. There is occasionally sickness and vomiting of sour and offensive, or of greenish or yellow fluid. If the proper remedies be used, in a few hours the skin becomes cool, perspiration breaks out, the tongue is found to be moist, the pulse softer and more quiet, the child falls into a deep and refreshing sleep, and on awaking appears nearly as well as the day before.

When the attack originates in a *single* meal of improper or undigested food, which has been dislodged by the appropriate treatment, such a speedy and favourable termination of the symptoms is not unusual. The name of *remittent* fever, which is so generally applied to the confirmed disease, would in such a case be inappropriate; but such is the history of the disease in its first stage and most simple form. It is rare, however, to find the cause so limited, and then the history is somewhat different: where, instead of a single error of diet, there has been previously an accumulation of ill-digested or of improper articles of food in the alimentary canal, although the attack may begin as suddenly, the termination is not so abrupt or satisfactory. Instead of the child being free from fever in a few hours after the onset of the paroxysm, there is only a remission of the symptoms; there is languor and fretfulness in the morning; the tongue is moist, but continues coated; the skin is cool, but dry; the pulse is quicker than natural, but not so rapid as during the accession of the symptoms; there is often drowsiness, and generally loss of appetite; the urine is scanty and high-coloured, and often deposits a white sediment. These remaining symptoms may be present more or less for several hours, though occasionally the child seems lively, takes notice of, and interest in, its usual pursuits, and is apparently nearly well. Towards evening, however, it becomes more restless and uncomfortable, and a distinct exacerbation of febrile paroxysm, often more intense than that at the onset of the disease, takes place, running the same course, and followed in the space of a few hours by as remarkable a remission. The condition of the bowels is one of the most uniform characteristics of the disease. Sometimes there is diarrhœa, much more commonly however constipation; but in either case the evacuations are highly offensive, the fetor resembling putrid meat. They are dark, pitchy, or clay-cloured, with little or no admixture of bile, or the biliary secretions appear vitiated and unmixed with the general mass. When the bowels have been previously confined, the accumulation of morbid secretions is usually enormous, and dose after dose of active purgatives is necessary to dislodge the offensive load. After the bowels have been cleared out, the dejections are still highly fetid, dark, and slimy, and their character is found to improve with the subsidence of the febrile accessions. In the course of the disease the breath early shows a faint and often an offensive odour, the coat on the tongue becomes more yellow or dirty, and the child is noticed to be frequently picking its lips, its nose, the corner of its eyes or its fingers. There is also not uncommonly a short hacking cough. As convalescence approaches, the paroxysms of fever become less marked, take place at a later hour, and last a much shorter time. The intervals of remission are longer, and are indeed almost complete intermissions, the child becoming more lively, returning to its natural habits, and recovering its appetite and strength. In other instances the disease does not come on so suddenly. For a few days the child is heavy and fretful, with disturbed sleep, loss of appetite, and coated tongue; the febrile accessions are very slight and irregular, but go on increasing in length and severity, till the more decided symptoms appear, and run a similar course.

The duration of an attack of the acute form varies from a few hours to a week or a fortnight, after which it gradually assumes a chronic form, and is often very protracted. The improvement in the condition of the alvine discharges is one of the earliest signs of recovery; they become less and less

fetid, and more natural in appearance, and when the free and healthy action of the liver first begins, bright orange-coloured bile is frequently poured out in great profusion. The dejections are more decidedly fæculent, and, if the food be of a proper quality, they are properly smooth and blended; the urine becomes more abundant, pale, and without lateritious deposit; the tongue becomes gradually clean; the disposition to pick the skin ceases; the sleep is tranquil and refreshing; the countenance is no longer subject to irregular flushings, or to the peculiar pallor during the remissions; the skin is soft, moist, and cool; the pulse tranquil; and convalescence is established. For a considerable time after this favourable termination, however, a slight error in diet, either as to quality or in quantity, will bring on a relapse. The same effect will often result from omitting to keep the bowels free from any accumulation, from the too early use of tonics, from exposure to damp air, cold, or mental or bodily exertion. Frequent relapses generally terminate in the chronic form, and it is important to bear in mind, that a frequent cause of relapse, as well as of some of the complications to be presently mentioned, is not unfrequently to be traced to the too long continuance of violent purgatives, or to the irritating nature of the remedies employed.

Without subscribing to the doctrine of Underwood, that this disease is "remarkable for being always void of danger," it is certainly true with respect to the *simple acute* form: we have never, indeed, met with or heard of a case terminating fatally; where death has occurred, the case has been at an early period complicated either with dysentery, or gastric or enteritic inflammation. In such instances the symptoms have been mixed, and the fever has soon lost much of its remittent character, though in all infantile complaints there is a great tendency to remissions, which observe a marked degree of regularity. The dysenteric complication is indicated by the appearance of the evacuations, which are frequent, attended with violent straining, consist almost entirely of mucus, and are often mixed with blood; while the acute pain in some part of the abdomen, increased on pressure, with retraction of the limbs, early tympanitis, and tendency to constant sickness, indicate the existence of intestinal inflammation. In the acute stage of these complications, the peculiar fetor of the evacuations soon ceases to be constant, and often entirely disappears; but it returns again after a time perhaps, notwithstanding that the inflammatory state of the intestinal mucous membrane has subsided. By the majority of practitioners in this country, however, this absence of fetor of the stools in the progress of the acute form of infantile remittent fever is not considered to be at all uncommon, and they are unwilling to admit the existence of inflammation in such cases. The presence of pain, on the other hand, is by no means a necessary proof of the existence of inflammation, and the tenderness on pressure is often deceptive, as young children, in the fretfulness of disease, are exceedingly impatient of any sort of disturbance, and evince great dislike to pressure on the abdomen or any part of the surface. We must not lose sight also of the fact stated by Andral and others, that even the most severe and fatal forms of intestinal inflammations are often painless.

We have stated our belief, that, when death takes place in the acute form of infantile remittent fever, the disease is complicated either with dysentery, or with inflammation of the mucous membrane of some portion of the alimentary canal. The appearances on dissection confirm this view; patches of the mucous membrane, generally of the small intestine, being softened, sometimes abraded, or inflammatory blushes and circles surrounding the mucous follicles. In some cases a pink blush pervades a considerable portion of the tube. In the instances where dysenteric symptoms have been most prominent, ulcerations in the ileum, cæcum, colon, or rectum, have been discovered.

The *causes* of the acute form of the infantile fever are those which directly or indirectly disorder the digestive organs. When a child has been previously in perfect health, the bowels regular and natural in their functions, and the diet wholesome, the onset of the symptoms may be generally traced to some acci-

dental deviation from ordinary diet. Although disorders of the stomach and bowels in children are said to be most common in the summer and autumn from the temptations to indulge in fruit, ripe or unripe, in our experience the acute form of gastric remittent is more prevalent about the period of Christmas, when the rich and indigestible fare of this season is partaken to excess by children who are too often encouraged by the foolishness of friends. The same symptoms again often arise when there has been no error in diet, but where digestion has been suddenly checked by exposure to cold or wet, or by some violent exercise or passion of the mind, soon after a hearty meal. The attack in these latter cases is even more sudden than in the former, for even where the illness may clearly be traced to some gross error of diet, the symptoms of fever often come on more slowly. In the instances in which the fever runs the shortest course, and the symptoms are subdued, and the child restored to health in a few hours, the stomach alone seems to be affected. In the more protracted forms the intestinal canal through its whole extent is more or less involved. In the complicated cases the irritation of the surface proceeds a stage farther, and there is ample reason to conclude that gastric inflammation has been excited. Whether this is a superadded affection, often the result of improper treatment, or merely an advanced stage of one and the same disease, is a question about which there will probably be a diversity of opinion.

Diagnosis. We have observed that gastric remittent fever in its simple form becomes dangerous, rather from the complications with which it occasionally becomes involved during its progress, than from the actual severity of the disease itself. Whilst it is important to recognise such complications in their earliest onset, we must not forget that it is equally important not to confound the primary and secondary diseases, and that there are some affections which, though sometimes coexistent, are often through mistake considered as the primary or sole existing disease.

The presence of *worms* in the intestines produces some symptoms which to a certain degree resemble those of the remittent fever. At one time the complaint was generally supposed to depend upon this cause entirely; hence the appellation *worm fever*. Dr. Butter exposed the fallacy of this theory, and went so far as to declare, that so far from worms producing this fever, or many of the other serious maladies which have been ascribed to their irritation, their presence in the intestines was at least harmless and probably salutary, producing by their irritation an increased peristaltic action, by which the offensive matter which formed their pabulum was more expeditiously removed. Without going so far, we agree with Dr. Butter that the mischief from worms in children has been considerably overrated, and that much harm has sometimes arisen from the use of, and perseverance in, the more violent anthelmintics. Picking of the nose and lips, wasting of the flesh, pale countenance, enlarged abdomen, irregular appetite, coated tongue, with fetid breath, and unhealthy, dark, and slimy evacuations, would lead a practitioner and even an unlearned nurse to suspect the presence of worms. In these we recognise many of the symptoms of the infantile remittent fever; but there is no fever, especially with remissions, accompanying the presence of worms. There are also other points of distinction in vermination, such as itching of the anus, occasional voracious appetite, grinding of the teeth, and gnawing pain in the stomach. Neither is the emaciation so rapid or so great; and though there may be now and then flushing of the face, the flush is partial and often confined to one cheek: the peculiar condition of the urine before noticed is also absent in simple cases of worms.

The frequent hacking cough, with fever in some respects resembling hectic, might lead to a difficulty in distinguishing gastric fever. The occasional existence of tubercles in the lungs, in every stage of disorganisation, in young children, and even in the unborn fœtus, though more rare than in adults, has been most clearly proved: when there is superadded to the remitting fever of the real hectic, the peculiar *picking* propensity, many might be led to

fix upon the bowels as the sole source of irritation; but we have often seen cases where, though the picking was strongly marked, there was no intestinal irritation, the lungs being the seat of extensive disease. In the protracted forms of remittent fever, especially in scrofulous constitutions, tubercles in the lungs are very apt to form or be called into action, and to lead to a fatal termination. It is of course highly expedient to recognise their presence and the progress of disorganisation: in modern times mistakes are less likely to occur, if auscultation be resorted to in doubtful cases. Besides this, the presence or the absence of the depraved and fetid evacuations from the bowels, the enlarged abdomen, the coated tongue, and other signs of intestinal disorder, will guide our opinion; but it is on the signs conveyed by percussion and auscultation, that we can best depend for an accurate diagnosis.

Tabes mesenterica, which forms one of the most common complications, and is often produced by the irritation in the mucous membrane of the bowels, which takes place either in the course of the disease, or as the result of improper treatment, is also more frequently confounded with the chronic form of gastric fever than perhaps any other malady. The features of resemblance are however sufficiently distinct to enable us to distinguish between them; but we must not fail to remember that the two diseases often run their course together, especially in children of the scrofulous diathesis. Of course when this occurs, the concurrence of the blended symptoms will give us a correct view of the case. In mesenteric disease we find wasting, "but it is slow and regular, not variable and rapid as in bowel complaints." (Evanson and Maunsell on the *Diseases of Children*, p. 294.) The appetite is voracious, the abdomen enlarged and hard, and in the advanced stages enlarged veins may be seen meandering over the surface. The enlarged glands of the mesentery may be generally distinguished by manual examination of the umbilical region, and it is rare to find instances where other glandular enlargements, chiefly in the groins and the neck, do not take place at the same time. To these signs we may add the occasional griping pain about the navel, increased by *deep* pressure, with the regular recurrence of dull pain in the abdomen, lasting often for three or four hours, and accompanied with a sensation of sickness on pressure. There is generally a permanent rapidity of the pulse and hectic exacerbations, but no regular remitting paroxysms, and no picking. The appearance of the dejections is also peculiar, differing from those in the remittent fever in many remarkable points. The motions in mesenteric disease are white and chalky, or dark and ochry, or even blue or grey, but rarely fetid or slimy, and not tinged with either yellow or green bilious matter. They generally appear altered by the omission of some of the usual ingredients of healthy fæces, and not by the excess or addition of depraved matters.

Most authors have particularly dwelt on the diagnosis between *hydrocephalus* and gastric remittent fever, and certainly it is of great consequence that no mistake should arise in confounding the one with the other, as it might lead to a fatal error in treatment. In the acute forms of either complaint the mistake would be very unlikely to take place; and therefore the question of their diagnosis need not occupy our attention. In chronic remittent fever, the child is so often reduced to an excessive state of exhaustion and emaciation by what is called *bold* treatment, that it is not uncommon to meet with the train of symptoms resembling the hydrencephaloid affection described by Drs. Gooch and Marshall Hall; and as the size of the head remains stationary, whilst the neck, body, and limbs waste, the deceptive appearance of enlargement of the head is often given. In scrofulous constitutions we may often meet with real cerebral disease, especially of that form called tubercular meningitis, where tubercles are developed in the substance of the brain itself, during the protracted course of remittent fever. When we consider also how constantly disordered states of the digestive organs produce functional disturbance of the brain, it will be easy to suppose that disease of structure would be likely to follow. We here meet with the chief difficulties, because, whilst the occurrence of cerebral symptoms is to be watched for, guarded against, and properly treated, we must

not neglect the condition of the digestive organs as the original seat of the mischief, and the cause perhaps of the complications. The drowsiness and stupor which are sometimes found accompanying simple remittent fever, both during the paroxysm and in the stage of remission, are different from similar symptoms arising in cerebral disease, as there is always a readiness to be roused, no affection of the pupil, and no strabismus. The head also is not, whilst the abdomen is, the hottest part of the body, and there is no convexity of the fontanelle, distension of the veins of the scalp, or peculiar expression of countenance, which denote the chronic forms of affections of the brain and its membranes. When we take into consideration also the absence of convulsions, of obstinate constipation, suppression of the urine, and the other more decisive proofs of effusion, and moreover reflect on the symptoms which characterise the true gastric remittent fever, the two diseases can scarcely be confounded. (See also HYDROCEPHALUS.)

Treatment of the acute form. Keeping in view the usual exciting causes, if we are called to the patient sufficiently early, and especially if there be sickness, an emetic of ipecacuanha will be advisable, the action of which may be encouraged by warm diluent drinks. This will sometimes dislodge the offending mass, at once relieve the symptoms, and the child will fall into a placid sleep; the next morning, however well the child may appear, it will always be proper to administer an active purgative, either of calomel with jalap or scammony, or a dose of castor oil, salts and senna, or rhubarb and magnesia, proportioning the dose to the age of the child. Should the time for an emetic have gone by, from the number of hours which have passed before our assistance is required, we may begin at once with the purgatives, but then it will be generally found necessary to give the calomel alone in the first instance, on account of the irritability of the stomach rendering it difficult for the child to retain medicines which are nauseous or in large quantity, but following it up a few hours after with some other purgative. Enemata may be conveniently employed should this irritability of stomach, or the obstinacy of a young child, interfere with the administration of ordinary purgatives. A warm bath should also be used, particularly if there be much restlessness, or, should this be inconvenient, the feet and the abdomen may be fomented. Effervescing saline draughts, or a few grains of nitrate of potass in solution, or some of the nearly tasteless neutral salts, such as the tartrate or phosphate of soda, may be given at intervals in lemonade or barley-water. The room should be kept perfectly cool and still, the light should be excluded, and the patient supplied frequently with cooling drinks. The removal of the contents of the alimentary canal is generally followed by a subsidence of the febrile paroxysm; as long, however, as the stools are fetid and unhealthy, the patient will be liable to a recurrence of the fever, and the abatement of the symptoms will not be complete. If the last evacuation appear healthy, with due admixture of bile, we may leave the patient at rest for a time. In the interval great care must be taken that the nourishment given be entirely fluid, and of such quality as to be unirritating and easily assimilated; barley or grit gruel, weak broth, arrow-root, or rennet whey, will be the safest articles of food. If the dejections continue healthy, there will probably be little or no return of fever, and it will be only necessary to take care that the child resumes its usual habits and its ordinary diet with the greatest caution. Should, however, the regular remissions of fever supervene, it will be requisite, on the recurrence of the paroxysm, to resume the treatment. It is not uncommon to find the bowels exceedingly obstinate, so that very large doses, or a frequent repetition of purgatives, are required to expel the acrid ingesta.

It is always necessary to inspect the evacuations, instead of trusting to the report of the nurse. The state of the abdomen on pressure, as to fullness and hardness, must be also attended to, and we should closely watch the indications of pain or tenderness. The fullness and hardness, distinct from collections of air, which are easily detected by percussion, will denote the necessity of follow-

ing up the use of active purgatives, which may be continued at sufficient intervals, so as not to harass and exhaust the patient, till we are satisfied that the intestines are emptied. The signs of tenderness on pressure should lead us to be very cautious in the exhibition of irritating purgatives; castor oil or the neutral salts will perhaps be the safest, and the calomel may be combined with extract of henbane or hemlock, and given in smaller doses at shorter intervals. The abdomen should now be fomented, and if the pain increases and becomes constant, and the febrile symptoms more permanent, there will be no doubt as to the propriety of applying leeches, which we have found more salutary than general bloodletting. The number of leeches, and the repetition of them, must of course be adapted to the strength and age of the child, as well as to the severity of the symptoms. Many have urged that the disease is so exhausting and so liable to be protracted, that abstraction of blood should be avoided; but it will generally be found that active treatment, pursued judiciously in the early and acute form, will be most likely speedily to arrest the symptoms, and prevent the exhaustion consequent upon the more protracted or chronic form. As the symptoms subside, smaller doses of the remedies recommended may be employed; at more distant intervals, and when the secretions have become healthy, the tongue clean, and the fever subsides, it will be sufficient to give a gentle dose of rhubarb with magnesia or sulphate of potass every other day. At this time the power of the digestion may be assisted by a light vegetable bitter, with ammonia or the other alkalies, twice or three times a day; and we have much confidence in the mineral acids, and especially in Meynsicht's vitriolic elixir (an imperfect ether, formerly much in repute in atrophy and consumption), in doses of from five to thirty drops, according to the age of the child. As the appetite returns, the diet may be slowly and cautiously improved; but it must be always recollected that the slightest excess or carelessness, or any neglect in the management of the bowels, will be likely to be followed by a relapse.

2. *Symptoms of the chronic form.* The *chronic* form of infantile remittent fever either succeeds to an acute attack, or begins in a more slow and insidious manner, after a longer continuance, or a succession of causes similar to those which induce the acute form. Long habits of indulging in improper articles of diet, swallowing food rapidly, and consequently without due mastication, carelessness and neglect in the management of the bowels, and perhaps exposure to an impure, damp, or cold atmosphere, and insufficient exercise, are the most frequent causes of this form of gastric remittent fever. Dr. Butter (*op. cit.*, p. 33.) is of opinion, that both forms of the disease are occasionally epidemic and even contagious: there are certain seasons, as before mentioned, at which it is more prevalent, from circumstances incidental to the period of the year, rather than from any state of the atmosphere: we have never met with instances where it could fairly be considered contagious, and we believe that this doctrine is now exploded. This form of gastric fever is frequently observed to follow many of the ailments to which early childhood is liable, such as hooping-cough, measles, scarlet fever, or accidental attacks of diarrhœa from dentition, &c. chiefly perhaps, because in the course of such diseases, the digestive functions are often much deranged, and in the anxiety to restore strength, nourishing diet is too early and too abundantly supplied.

The symptoms resemble those of the acute variety, except in intensity; some are less severe, others more marked. The paroxysms of fever are less intense, but they last longer, and in the intervals the child is less free from irritation: there is not perhaps so large a collection of solid fæcal matter in the intestines, and the offensive smell is less striking, the dejections having rather a faint odour; but there is often diarrhœa, and the colour of the motions whether spontaneous or resulting from medicine, is as unhealthy, often very dark or clay-coloured, or resembling thin mud. The abdomen is hot and tumid from flatulence, the tongue loaded with a dirty fur, the edges often red and dry, but becoming more moist, though not cleaner in the remission; the teeth are

often covered with sordes, and the lips parched; the skin feels harsh, and from the rapid wasting, hangs in wrinkles about the limbs: in very protracted cases the child has the appearance of shrivelled old age. The urine is scanty and high-coloured, with much white sediment, especially during the remissions; the breath is either very offensive or has a peculiar faint odour; there is generally also frequent hacking cough, and in a remarkable degree the propensity to picking before mentioned, not however confined to the lips, eyelids, nose or fingers, but the child picks every part of the body, the bed-clothes, and even the face of the nurse. If there be an accidental pimple on the skin, that will usually become the favourite spot to be picked, and sores are often produced, the edges of which are still more eagerly attacked, so that the fingers are constantly stained with blood. This picking is by many considered one of the most conclusive signs of the genuine disease; we have however met with two cases, in which it was a very prominent symptom, though the patients had no particularly disordered condition of the digestive organs, but died from empyema supervening or following hooping-cough complicated with pneumonia. As this picking becomes so intense, in what Dr. Underwood by his description considers the infantile *hectic* fever (which is only the advanced stage of the chronic remittent), perhaps it may be ranked as a symptom belonging to the hectic of children, whether produced by intestinal or pulmonic or other organic disease. In the advanced stages the fretfulness of the child is often most distressing, or sometimes it lies for hours taking little or no notice of any thing, and either apparently dozing with half-closed eyes, or when roused immediately resuming the incessant picking. At this period the appetite is very often craving, and the child evinces great irritation and distress on being denied food. In other cases there is urgent thirst, but the appetite is lost; in others again there is neither appetite nor thirst, so that there is great difficulty in getting the child to swallow any thing, from its dislike to be disturbed. In the still more severe cases there is generally some complication, either diarrhœa or dysentery, when the mucous lining of some portion of the intestines is found either softened, abraded, or the intestinal follicles enlarged and in various stages of ulceration. It is still more common to find that mesenteric disease is excited by the extension of the irritation to those glands; when this happens the abdomen is hard and tumid, and the enlarged glands may often be felt through the parietes of the abdomen. This complication is more apt to occur where there is a scrofulous taint, and in such constitutions tubercular disease in the lungs occasionally supervenes. Instances of death without one or other of these complications are rare, and even when the child appears to be reduced to the lowest degree of emaciation and debility, by proper treatment recovery may be effected.

Treatment of the chronic form. The remedies for the chronic form of gastric remittent fever are to a certain extent necessarily similar to those which have been recommended in the acute. It is not an uncommon mistake, however, to employ too active measures, and especially to administer, almost daily throughout this more protracted disease, acrid purgatives and even large doses of calomel, by which not only the irritation of the mucous membrane is aggravated to a fearful extent, but the more fatal complications already enumerated are frequently induced. It is not at all unusual to meet with instances where purging is pushed so far, that a fatal dysentery is the consequence, characterised by dejections of bloody mucus, or of fibrin assuming the tubular mould of the intestines. In other cases the inflammation terminates in softening, abrasion, or ulceration of the mucous membrane, and there is also reason to suppose that mesenteric disease has been excited or accelerated by this abuse of purgatives. One would suppose by the directions often given by practitioners, that it was impossible to purge or starve too much in these cases; but it is chiefly under such treatment that we meet with those examples of extreme emaciation and lingering disease, in which the constitutional powers are either destroyed, or death ensues.

If, in the first instance, we have reason to suspect accumulation in the intestines, an active purgative, containing calomel, may be safely and advantageously administered; nor is there any objection to have such more powerful medicine occasionally repeated, especially if, by any error of diet or negligence in the management, a relapse or an increase of the symptoms have taken place. But after the purgatives have sufficiently cleared the bowels, the secretions will be best improved by milder remedies: mercurials in gentle doses, especially the Hydrarg. cum Cretâ, or calomel rubbed down with chalk, should be given every night, or every other night. A combination of the mercurial with a diaphoretic, particularly ipecacuanha, or, if much restlessness, with Dover's powder, will be found very useful. A mild purgative on the following morning, such as castor oil, compound decoction of aloes, rhubarb and magnesia, or rhubarb with sulphate of potass, will be necessary. Denman, Underwood, Butter, and Pemberton, have all spoken highly of this latter preparation, considering it peculiarly adapted to meet the indications by relieving the fever, improving the secretions, and quickening the action of the bowels and kidneys. The quantities must of course be adapted to the age and strength of the patient, but from two to three evacuations will be desirable daily; a larger number will exhaust the child, and fewer will scarcely keep the bowels sufficiently free from offending matters. Saline medicines at intervals will be also beneficial; and the addition of henbane, hemlock, or lettuce, has been found by most practitioners to allay the general irritation, compose the restless distress of the child, and render the action of the remedies more genial. Frictions with oil over the abdomen, or with slightly stimulating lotions, will often be of use, and we have especially observed advantage from the nitro-muriatic acid largely diluted. A nightly warm bath should not be omitted; it promotes perspiration, and relieves the mucous surface, besides composing the child and contributing to its comfort.

The diet during the early treatment should be such as will most easily assimilate, and will be least likely to produce irritation, if only partially digested; for this purpose we may allow chiefly barley-water, rennet whey, thin arrowroot, or other farinaceous gruels, and weak chicken or veal broth. When there is thirst, soda-water or toast and water, or slightly acidulated beverages, may be taken.

It is not only that the secretions are unhealthy, but the digestive functions seem entirely suspended in this disease; so that, as Dr. Pemberton has remarked, the food is often passed through the bowels, either unchanged or converted into a putrid mass, as if it had been merely subjected to heat and moisture, and not to digestion. On this account, as soon as the febrile symptoms have subsided, the tongue has begun to clear, and some portion of healthy bilious or fæculent matter passed from the bowels, we may commence very cautiously the use of such means as will gradually restore the tone of the stomach and bowels, as well as improve and remove the unhealthy secretions.

In the more early stages of improvement, we have found the mineral acids upon the whole the safest medicines for this purpose. The infusion of roses may be conveniently employed, and it will be easy to add some of the neutral salts, with which sulphuric acid is not incompatible, to answer the other indications required. Nitric acid or chlorine, by acting perhaps upon the liver more than the other acids, may be in some respects preferable. Meynsicht's vitriolic elixir has also with much justice been praised. The vegetable bitters combined with rhubarb or aloes, and some alkali, may in some cases be given at an early period; but great caution must be used, as a too early recourse to tonics may renew the accessions of fever, with the whole train of disordered actions. As convalescence advances, more decided tonics may be tried, such as bark, quinine, or the preparations of iron; but it will still be advisable to give occasional doses of aperients, and perhaps also of mercurials.

The gradual improvement of the diet may keep pace with the trial of the tonics and the renovated power of the stomach; but extreme caution is ne-

cessary in this respect, both as to the quality and quantity of the food. A larger meal than usual, even of the safest description, is often followed by a serious relapse; while premature indulgence in more solid diet, or the least carelessness as to the indigestible nature of it, will at once undo all that has been effected towards recovery. For many weeks after convalescence has apparently been established, this cautious restriction is advisable; and the injudicious pampering by parents and friends, under the pretext of strengthening the poor debilitated child, becomes one of the most frequent causes of ultimate disease. In the stage of convalescence the skin should be guarded from damp and chills, a very ready source of derangement of the digestive organs, whilst pure air, well-ventilated apartments, and tepid bathing, are valuable auxiliaries. The advantage of change of air is great. Dr. Evanson indeed remarks (*op. cit.*), that, "through the whole management of remittent fever, nothing is more remarkable than the benefit derived from the latter source (change of air): we have frequently seen a patient who had been several weeks labouring under the disease, enjoy tranquil and refreshing sleep the night after his removal to a distance of three or four miles from his ordinary abode."

HECTIC FEVER.

Definition. — Symptoms. — Diagnosis. — Causes. — Treatment.

Hectic Fever, so named on account of its continuity and inveteracy (from the Greek adjective, ἑκτικὸς, habitual), has been arranged by not a few pathologists among Primary Fevers. The soundness of that arrangment, however, will scarcely be admitted in the present day; for it seems well-established, that true hectic occurs only in connection with serious organic alterations of structure, and seldom unless where suppuration exists. It is only by extending inconveniently the meaning of the term hectic, that this affection can be viewed as primary in its nature.

As generally understood by British practitioners, it may be defined — *A form of remittent fever of long and indefinite duration, consisting of an exacerbation once or sometimes twice a day, attended with extreme attenuation of the body, and depending either on suppuration or upon important organic derangements of structure.* Some modern authors, and among these *M. Broussais*, the latest writer who has written expressly on the subject, have adopted a much more comprehensive definition, according to which "hectic consists of a slow continued fever of long and indefinite duration, and attended with debility and emaciation." This definition has been adopted, as appears from the writings of the last mentioned author, in order to include what has been more recently characterised, especially in this country, under the name of irritative fever, and which it is important to distinguish from the true hectic of existing nosologists.

Symptoms. The symptoms of hectic fever when it is fully formed are very characteristic. Like other fevers it is obscure in the beginning, and can scarcely be distinguished from the febrile state at the commencement of continued fever, or that which attends some chronic internal inflammations, chronic visceral derangements of structure, and gastro-intestinal irritation. The pulse is generally frequent, varying between 90 and 120, — always irritable, so that slight sources of excitement increase its frequency, — and usually small, jarring, yet compressible. Irregular exacerbations occur, preceded frequently by chilliness, attended with heat of skin, some flushing of the features, and a

burning sensation in the palms and feet, but not always followed by perspiration. Although the exacerbations occur irregularly upon the whole, they are observed to be most frequent after meals, especially breakfast, and to recur very regularly in the fore part of the night, at which time the paroxysm is generally greater than at any other period. The digestive functions are at this stage not unfrequently, yet by no means invariably disturbed, the tongue being loaded, the stomach weak, and the bowels subject to constipation. There is always much debility; and the emaciation is commonly great in proportion to the amount of fever and other functional disturbances — although some remarkable exceptions are observed to this rule, even in that most unequivocal of all forms of hectic which attends pulmonary consumption.

The disease continuing to advance along with the progress made by its fundamental cause, its characters gradually become more strongly marked and diagnostic The irregular febrile paroxysms gradually pass into a continual state of excitement of the pulse, with a regular exacerbation of fever occurring at least once and often twice in the twenty-four hours, usually at the same periods of the day. The principal exacerbation commonly begins towards evening, reaches its height about midnight or a little later, and goes off early in the morning. *Cullen* held that another exacerbation in the forenoon was an essential character of hectic fever. This however is a mistake, into which he was led probably by his erroneous physiological belief in a double diurnal revolution in the rate and excitability of the circulation in the healthy state of the body. There is no doubt that a secondary exacerbation often takes place during the forenoon in hectic fever. But in very many cases no such incident is observable; and in many others where it does seem to occur, the exacerbation is not essential, but incidental merely, and nothing else than an increase of that diurnal *febricula* or excitement, which takes place in many irritable habits in consequence of the digestion of the meal of breakfast.* In some instances where only one distinct exacerbation occurs, it is observed to take place not during the night, but in the forenoon between ten and four; which however is a rare circumstance. The paroxysm or exacerbation of hectic is essentially a paroxysm of remittent fever. The cold stage is often wanting, especially when the disease is fully formed. The hot stage is almost invariably followed by considerable perspiration, unless means be taken to prevent it. The interval is generally one of remission merely, the pulse continuing frequent. But sometimes there is an intermission as complete as in the most characteristic case of ague; and although the pulse in the interval may be frequent, the animal temperature is often not above the healthy standard.

In hectic fever the appetite and digestion, though frequently disturbed in the early stage, are for the most part entire when the disease is fully formed, and accompanied with a clear, moist, reddish tongue; but at a later period the stomach often becomes again irritable, vomiting of food is common, and

* The doctrine of Cullen and other physiologists, that the healthy circulation is subject to a double diurnal excitement, and that the chief period of excitement occurs in the evening, was first disproved by *Dr. Knox* in 1816. He found that there is only one diurnal revolution, independently of incidental excitements; that the pulse is more frequent and excitable in the morning on awaking, gradually becomes less so towards evening, and acquires its greatest state of depression about midnight or before going to sleep. The writer having, in ignorance of these investigations, made some experiments of the same nature a few years afterwards, he can confirm the results at which *Dr. Knox* arrived, except that, instead of observing actual excitement of the pulse in the morning, he found only very marked excitability. Under a careful avoidance of all accidental stimuli, such as food, exercise, mental excitation, and the like, he found no difference whatever either in the pulse or animal heat in the course of the whole day and night; but on awaking in the morning there was so great excitability, that trifling stimuli raised considerably the pulse and temperature; after midday this excitability gradually decreased; and towards midnight it was lower than at any previous period. It is remarkable, therefore, that the ordinary period of greatest excitement in hectic fever, continued fever, and many other febrile diseases, occurs exactly at the time when there is the least excitement or excitability in the healthy state of the functions

the tongue and fauces are often tender and covered with aphthous ulcers. The thirst is seldom urgent; the urine usually high-coloured and sedimental; the skin soft, delicate, and easily excited to perspiration; the bowels regular or inclined to constipation. Diarrhœa is often considered a symptom of advanced hectic; but it is not essential, and occurs only when inflammation and ulceration of the bowels arise secondarily to the primary cause which occasions also the hectic itself. There is a remarkable paleness and bloodlessness of the whole integuments, a pearly appearance and want of vascularity of the conjunctiva, blanching, and crookedness of the nails; and during the diurnal exacerbation there is a bright red, almost circumscribed spot upon each cheek, contrasting strongly with the pallid hue of the rest of the body. The debility is commonly great, and always attended with progressive and in the end extreme emaciation. Towards the latter stage œdema of the ancles and even of the legs is not uncommon. The mind is seldom impaired till near the close, when mild delirium frequently sets in. Previously, however, the mental faculties are not merely in general undisturbed, but even in many instances unusually clear and vigorous; and the spirits are upheld by false confidence and hopes of recovery. The duration of hectic is exceedingly various, and chiefly depends on the progress of its fundamental cause: frequently it endures for many months.

Diagnosis. The diagnosis of hectic fever is an object of much importance in practice, both directly on account of the disease itself and its treatment, and also indirectly for the sake of the inferences which may be drawn from its presence and absence in various diseases. In some circumstances, for example, the presence of hectic may determine the question of the existence of certain organic disorders; and in others, as in chronic pleurisy, it may point out the pathological termination of the disease and the nature of the fluid effused. Fortunately it is for the most part easily distinguished from all other fevers, by the characters which have just been given above. With one form only of fever is it apt at times to be confounded, namely, certain varieties of irritative fever, especially those which attend chronic internal inflammations. In such cases, however, the febrile exacerbations, though frequent, are more irregular in their periods than where true hectic prevails; or where a periodicity is remarked, the exacerbations are found to be connected with the excitement incidental to digestion. In irritative fever the febricula of digestion is often much increased, the pulse being raised twenty pulsations or more for some hours after meals, and this state being regularly followed by free perspiration. The same thing is sometimes observed in hectic fever, though seldom so remarkably; and, where it does occur, there is also the regular and proper exacerbation of hectic late in the evening, whether a meal be taken or not. Another circumstance connected with fever, which may occasionally cause deception, is, that sweating often occurs on the patient awaking in the morning. In all states of debility the skin is frequently observed to be bathed in perspiration as often as the patient awakes. But this occurrence is easily distinguished from the sweating of hectic by its happening at all times of the day indifferently, and by the sweating of hectic taking place whether the patient is asleep or awake, and generally indeed before the approach of sleep in the early part of the morning.

Causes. Much vague discussion has arisen, both among nosographists and express authors on hectic fever, as to the causes of this affection. It would be unprofitable to reproduce that discussion here. It is sufficient to observe, that the doubts and differences which have prevailed on the subject seem to have originated mainly in the discrepant statements and opinions of authors respecting the true characters of hectic. If the forms of irritative fever adverted to a short time ago, are to be considered as varieties of hectic,—namely, where exacerbations terminated by sweating occur irregularly, or present themselves only in connection with the excitement of digestion, there is no doubt that the causes of hectic are numerous and diversified, and that it might even with an appearance of

justice be held with some authors to be occasionally a primary disease. But if the characters of hectic be taken as they are commonly understood in this country, and as they have been laid down by *Cullen*, then there seems as little room for doubt that the disease originates only in connection with suppuration or serious organic derangements of structure in the internal viscera; so that this character may even be correctly admitted into its definition. By confounding together irritative and hectic fever, some modern authors have been led to extend the causes of the latter affection to an extraordinary degree. Thus *M. Broussais* gives illustrations from his own experience, as well as from the literature of medicine, tending to show that hectic may arise from a great variety of gastro-intestinal irritations, such as errors of diet, foreign bodies in the alimentary canal, especially irritating poisons, diarrhœa, and the sequelæ of intermittents,—also irritations of the pulmonary mucous membrane from foreign bodies or chronic catarrh,—gonorrhœal or leucorrhœal irritation of the mucous membrane of the genital organs, — excessive hæmorrhage, or suppression of habitual hæmorrhagic discharges, — protracted lactation, — excessive sweating, and extensive chronic diseases of the skin, — mental irritation or exhaustion from excessive study, and violent passions, — general bodily fatigue, — excessive atmospheric heat or cold,—and, finally from organic diseases of internal organs, and suppuration either of internal viscera, or in other more external parts of the body. Under the direction however of a just nosological arrangement and a correct diagnosis, the greater number of these supposed causes must be thrown aside; and the experience of Cullen is probably that of all his successors, that a hectic fever, such as he describes, is constantly found to be a symptom of some topical affection, most commonly of an internal suppuration.

The most remarkable and characteristic cases of hectic occur along with internal suppuration, such as ulceration of the lungs consequent upon tubercular deposition, purulent effusion into the chest, the result of chronic inflammation of the pleura, suppurating tumours in the pelvis or abdomen, lumbar abscess, and the like. Its symptoms are also usually well-marked where the bones are affected with caries. Its characters are likewise for the most part distinct in malignant diseases, especially scirrhus and fungoid tumours, when ulceration is established. The degree or intensity of the hectic, however, is not always proportioned to the extent of the suppurating surface, the accumulation of pus, or extent of discharge. In malignant tumours, for example, in caries of the bones, and in abscesses formed in the substance of internal organs, the hectic is often intense, though the extent of the ulceration or discharge is insignificant. The usual rule would seem to be, that the general system sympathises much less with the extent of the injury, than with the importance of the affected organ on the one hand, and with the malignity of the fundamental disorder on the other. Some extraordinary exceptions occasionally occur, as where extensive suppurations form in the liver, or sac of the pleura, or the brain, without hectic fever being produced at all; but such incidents are too rare to affect essentially the general law.

There is likewise no question, that hectic fever may be occasioned by serious organic diseases without purulent matter being formed. Carcinomatous affections, for example, sometimes engender all the phenomena of hectic before they reach the stage of suppuration; and the same is observed to occur in regard to some chronic inflammations, such as chronic pleurisy and chronic pneumonia. In these circumstances, indeed, the exacerbations of fever are most generally irregular, so that the febrile state is rather of the nature of irritative than of hectic fever. But still the symptomatic affection does occasionally put on the characters of true hectic. Hence in chronic inflammations the advent of hectic fever is not so unequivocal a sign of suppuration having taken place as many practitioners imagine. The writer has repeatedly seen a perfect hectic attend chronic peripneumony and chronic pleurisy, where on inspection after death no trace of suppuration was found, but merely general hepatisation of the lung in the former case, and sero-fibrinous effusion in the

latter. In one of the cases of chronic pleurisy now referred to, the fluid in the chest was evacuated by puncture, in the confident expectation that purulent matter would be discharged; but the only matter which issued was a serum of light density, in which fleecy strings of fibrin formed on standing.

Treatment. The treatment of hectic fever is necessarily in part subordinate to that of the fundamental disease on which it depends. But there are likewise certain measures which may be resorted to for mitigating more directly the severity of the febrile action. The antiphlogistic system is inadmissible except in those cases where the disease is clearly connected with chronic inflammation not in the advanced stage, or where acute inflammatory action, as often happens, is excited incidentally. In the generality of cases, an opposite system is rather called for; and a somewhat generous diet, including nutritive articles of food, and even the moderate use of stimulating liquids, is found to support the strength without increasing the febrile action. In every circumstance, however, the diet should be easily digestible and not too abundant, otherwise the stomach is enfeebled, and the heat and restlessness of the exacerbations increased. Tonics are of little service, except where they may be found applicable to the fundamental disease, or are required to correct the tendency to dyspepsia, which occasionally prevails at the commencement. In the latter case simple bitter infusions, such as of quina, gentian, or calumba, with or without the alkaline bicarbonates, are commonly found to answer best. The patient ought to be confined in cold weather to apartments maintained at a uniform and moderate temperature; and at night, when the sweating stage of the exacerbation approaches, the bed-clothes should be diminished as far as is consistent with his feelings. In mild weather however, and in a suitable climate, great advantage is found in persevering with gentle out-of-doors' exercise, as long as the strength will permit. Nothing contributes so much to the patient's comfort, both at the time and for the rest of the day; and in particular, the restlessness in the evening and the subsequent perspiration are better mitigated in this than in any other way. One of the most important objects of treatment in hectic is the diminution of colliquative sweating. In addition to the means already pointed out for this purpose, it is found that advantage is sometimes derived from tepid sponging of the head, face, chest, and arms, in the early part of the night before the sweating stage sets in. Of all internal remedies for the same end, none equals the sulphuric acid, which in this way is one of the most efficacious astringent refrigerants. The restlessness and want of sleep must be met with anodynes. These, indeed, are in general rendered also necessary by the cough, pain, or other uneasiness arising directly from the primary local disease. The whole list of narcotics has been had recourse to in such circumstances. Hydrocyanic acid in frequent small doses is sometimes decidedly serviceable; tea is commonly of some use; hyoscyamus, or some of the other solanaceous narcotics, is also often effectual; but the most efficient of all, and that to which all resort sooner or later, is opium, or a salt of its alkaloid. The great objection to opiates is their tendency to increase the sweating, which the conjunction of sulphuric acid does not always correct. Frequently, however, there is no alternative, as nothing but opium or morphia will obtain sleep or quiet. The compounds of morphia have the same advantage over the Galenical preparations of opium in this as in other diseases. This is not the place to enter into the treatment of the affections incidentally concurring with hectic, and arising secondarily to its fundamental cause. But it may be mentioned, that the best method of counteracting the diarrhœa which is thus so often associated with hectic, is by the administration of considerable doses of acetate of lead with small doses of opium, such as one or two pills twice or even three times a day, prepared like the lead and opium pill of the Edinburgh Pharmacopœia. No other treatment is so frequently and so promptly successful in arresting the diarrhœa, or is attended with so little risk of increasing the vicarious discharge by perspiration.

SMALL-POX.

Description and varieties. — Variola benigna discreta. — Variola confluens. — Secondary fever and its consequences. — Cutaneous inflammation. — Variolous ophthalmia. — Cerebral complication. — Thoracic complication. — Abdominal complication. — Other accidental complications. — Variola semiconfluens. — Variola corymbosa. — Variola maligna. — Variolæ anomalæ. — Variola confluens mitigata. — Variola varicelloides. — Febris variolosa sine eruptione. — Diagnosis of small-pox. — Prognosis. — Mortality: — Anatomical characters. — Causes. — Susceptibility of small-pox. — Recurrent small-pox. — Treatment. — Vaccination — history and progress of. — Phenomena of vaccination. — Circumstances which influenced the protecting power of cow-pox.

Description and varieties of Small-pox. Small-pox may be thus defined: — A fever commencing with sickness, headach, pain of the back, and general lassitude, followed on the third day by an eruption on the skin of pimples, more or less extensively diffused, which in the course of a week inflame and suppurate, accompanied in many instances by a similar affection of the mucous membrane of the nose and mouth; in some by swelling and inflammation of the subjacent cellular membrane, and occasionally by affection of the nervous system. The several kinds of small-pox which have been described by authors have reference, 1. to the nature of the accompanying fever; 2. to the quantity and aspect of the eruption; 3. to the concomitant and superadded symptoms.

The following are the principal varieties of small-pox mentioned by the best authors: — 1. *Variola discreta*; 2. *Variola confluens*; 3. *Variola semiconfluens*; 4. *Variola coherens*, or *corymbosa*; 5. *Variola regularis*, or *benigna*; 6. *Variola maligna*; 7. *Variolæ anomalæ*, under which head are included small-pox with affection of the brain, small-pox with affection of the chest, small-pox with diarrhœa, or dysentery. Small-pox is said to be *distinct* when the pustules admit of being counted, being placed at such distances from each other as not to coalesce, or run into each other, even when fully maturated. It is called *confluent* when the pimples are so close set as to run into each other on the third or fourth day of inflammation. The terms *clustered*, *coherent*, or *corymbose* small-pox is applied to that form of the disease where the pimples are confluent in patches, the patches being, however, separated by intervals of unaffected skin. Small-pox is said to be *semiconfluent*, when the papulæ are so far separated from each other, that they do not coalesce generally until the full period of pustulation.

The phenomena of small-pox, in all its forms and varieties, admit of a natural and useful division into four stages: — The first is the stage of *incubation*, extending from the reception of the variolous germ to the invasion of fever. The second is the stage of initiatory or eruptive fever, occupying three or four days. The third is the stage of maturation, extending from the development to the full maturation of the pustules, a period varying from five to nine days. The fourth is the stage of decline, desiccation, and *secondary* fever.

We shall begin by detailing the phenomena observable in an attack of distinct but full small-pox, occurring to a young person in the prime of life, unvaccinated, of good constitution, without any peculiarity of temperament, or disposition of blood and humours likely to interfere with or modify the ordinary train of symptoms. This being done, we shall proceed to show what are the characteristics of the other *varieties* of small-pox usually noticed by authors, and the modifications produced in the symptoms by difference of age, habit, previous condition of body and mind, and, lastly, by previously undergoing vaccination.

Variola benigna discreta.

Stage of incubation. It is observed by Rayer in his valuable treatise on the *Diseases of the Skin*, that this period (during which the system, after imbibing the variolous germ or poison, is preparing for its elimination) presents for the most part no morbid symptoms either of a general or local nature. The usual accuracy of this author is not well-displayed here. The fact is, that a variety of circumstances distinguish this period, commonly known to nurses as the period when the small-pox is *breeding*. In many cases the patient experiences at the moment of imbibing the germ or contagion some disagreeable feeling, such as an unpleasant odour, a sense of giddiness, sickness, or an inward sense of alarm and fright. The succeeding days are passed differently in different cases. Sometimes little or no inconvenience is felt: at times, however, there is present a certain degree of languor and lassitude; the patient is low-spirited, and disinclined to exertion; the nights are restless, and the digestion somewhat impaired. The usual duration of the incubative stage of small-pox is twelve days, but it is difficult to assign the maximum and minimum limit: possibly it may extend from seven to fourteen days.

Stage of initiatory or eruptive fever. On the eleventh or twelfth day from the reception of the variolous germ, rigors announce the setting in of the initiatory or eruptive fever. Sometimes one severe and long-continued shivering fit indicates to the practised physician the coming events: at other times, the rigors are less violent and recur irregularly. They are soon succeeded by the common evidences of pyrexia: — general pains of the limbs, a quickened pulse, diminished secretion, a hot skin, with dryness or disposition to sweating. But there are certain other symptoms very characteristic of incipient small-pox. They may be thus enumerated: — severe pain, or weakness as it is sometimes called, in the back, so that the patient has suddenly dropped down. We have known a female attacked about the expected period of parturition with such excruciating pain in the loins, that labour was momentarily expected. It proved to be the onset of severe semiconfluent small-pox Frequently the encephalon suffers. There is pain of the head generally, or pain referred to the temples. Among children a state of somnolency is frequently noticed, and they wake with a start or fright. The nervous system sometimes participates in a degree still more striking: — a child is unexpectedly seized with a perfect epileptic paroxysm; the adult becomes delirious, or falls into a state of stupor, and he may well be imagined on the eve of some severe cerebral affection; the face is flushed; the action of the heart is rapid and tumultuous. In some cases the stomach is the organ which first takes alarm from the impending evil. There is acute pain of the stomach present, aggravated by pressure, and accompanied by such incessant vomiting, that the physician, not without reason, suspects the presence of gastritis, and directs the loss of blood and the infliction of a blister. The irritable condition of the stomach frequently continues through the whole period of initiatory fever, and is not entirely subdued until the eruption has extended over every part of the surface, even to the legs and feet. In almost all cases there is marked prostration of strength. The expression of countenance is anxious: in some instances, where the habit is weak, there is an almost total collapse. The pulse is feeble; the skin pale, contracted, and cold: wine and cordials are here urgently required to keep the patient from irremediable exhaustion. All these more urgent symptoms however indicate, for the most part, the approach of a severer form of the disease than that which we are now describing. The pain of the back and loss of muscular power are the symptoms, from the comparative mildness or severity of which the best prognosis may be formed.

The phenomena now enumerated as the chief features of the eruptive fever of variola may be so variously combined, that it is often difficult to say on which organ or structure the poison has fixed itself in greatest force. Such symp-

toms may cease altogether with the appearance of eruption, or they may continue to harass the patient, in varying degrees of intensity, through the greater part of the next stage, that of maturation.

The duration of the initiatory fever of small-pox is one of the most important points in its history. By it alone the diagnosis is in many cases accurately established, and it will always attract the especial attention of the physician. It has proved, however, a fruitful source of controversy among authors. Prior to the time of Sydenham it was thought desirable to shorten the period as much as possible, and this was attempted by the employment of heating diaphoretics. Sydenham again believed (chap. ii. p. 34.) that "the more time nature employed in finishing the separation of the inflamed particles, the greater was the chance of ultimate success in the cure." There is little ground for either opinion. The period of initiatory fever is singularly uniform: in a large proportion of cases the eruption shows itself at the end of forty-eight hours from the occurrence of rigor, pain of back, or sickness, whether the subsequent symptoms be mild or malignant, the eruption distinct or confluent. This period may be lengthened from weakness of habit, the loss of blood, long-continued vomiting, or extreme cold; but, so far as our experience extends, it is never shortened.

The time occupied in the development of the eruption is liable to considerable variety. It is usually completed over the whole body in one or two days, but from accidental circumstances, like those which protract its first appearance, it may extend over a period of three or even four days. In a great proportion of cases the eruption of small-pox develops itself in the following manner: — Minute papulæ, sensibly elevated above the surface of the skin, first show themselves on the face and forehead. It is only in a very few instances that the eruption commences in the inferior extremities: it is seldom distributed in equal profusion over the whole skin. It often happens that one or two papulæ precede the general eruption, and have advanced to the state of vesicle before the surface is extensively occupied.

The sides of the nose, chin, and upper lip, generally display the earliest pimples: then, some are perceived on the neck and wrists: by degrees the trunk and thighs are occupied with eruption, the feet being almost invariably the part latest affected. With the completion of eruption terminates the second stage of small-pox, the initiatory stage, or fever of invasion.

Period of maturation. In all cases of distinct small-pox, and in a large proportion of cases of the semiconfluent kind, the constitutional symptoms experience a marked relief when the eruption is fully developed: — the pain of the back, the vomiting, and the headach abate, or disappear entirely; the respiration becomes less hurried; the pulse diminishes both in force and frequency; there is less jactitation and restlessness, and not unfrequently the patient gets some sleep.

On examination of the papulæ it will be found (where opportunity is given for observation by the moderate quantity of the eruption), that they are not thrown together confusedly and without order, but that they are arranged in groups of three or five, assuming often a crescentic shape. Two or more groups coalescing form, in some cases, a complete circle of papulæ.

Anatomical characters of the variolous vesicle. Great attention has been paid by modern authors to the anatomy of the skin under small-pox. Cotugno commenced the investigation, which has since been diligently followed up by John Hunter, Dr. Adams, Mr. Cruikshank, Dr. Craigie, and various continental authors, more especially Dr. Petzholdt. A full account of the latest views on this subject may be found in the *Brit. and Foreign Med. Rev.*, vol. v. p. 470.

The following is a brief sketch of the opinions now entertained as to the structure of the variolous pock. The inflamed spot (*phlyctidium*) has its seat in the cutis vera. It commences on a central point called the stigma, spreads

by radiation on the surface, and penetrates in different cases to a greater or less depth. Beneath the epidermis, and constituting the greater part of the phlyctidium, is found a substance of a consistence like pulp or thick mucus — a sort of pseudo-membranous layer, or disc, which is not considered as any part of the skin itself altered by disease, but as a new product. This substance was known to John Hunter, by whom it was called the variolous slough. The vesicle, when further examined, is found to be divided into numerous cavities or cells: it is multilocular. The floor of each phlyctidium presents the papillated structure of the skin elevated and marked with fissures and chinks. At the height of suppuration this part is swelled, and moist like a sponge. The fluids (lymph and purulent matter), which at different stages of its course distend the cells of the phlyctidium, are thrown out by vessels which shoot from the red central point or stigma. This point may readily be detected on the vesicles of the face and trunk (at least on the greater portion of them) by a depression on the surface of the vesicle, where the corion and epidermis adhere. This central depression, abundantly obvious in most cases to the naked eye, is in an early stage of the disorder made more manifest by the microscope. It gives that peculiar umbilicated form to the variolous vesicle, which is the great characteristic of small-pox.

The inflammation of the phlyctidium is accompanied by an *areola* or halo of a damask-red colour, more or less vivid according to circumstances, and which extends to some distance beyond the margin of the vesicle. The secreted fluid, at first thin and limpid, distends in the first instance, and elevates above the level of the surrounding skin the sides of the vesicle. At length the filamentous attachment of the stigma to the cuticle is destroyed, the central depression ceases to be observed, the pustule acuminates, and ultimately bursts, discharging a well-formed purulent matter of the consistence of cream, and of a yellowish colour.

Leaving these anatomical minutiæ for matters of more direct practical application, it may be observed that the maturation of each individual phlyctidium occupies, in the class of cases now under consideration (the regular distinct benignant), a period of seven days. It is seldom, however, that the condition of the eruption is uniform over any large extent of surface. The pustules on the face and neck usually attain their proper size, and discharge their contents first, then those of the trunk and upper extremities, while the parts at a distance from the centre of circulation are slow in reaching maturity. Three, four, or even five days, therefore, may intervene between the period when the pustules begin to burst on the face and the perfect maturation of those on the feet.

The constitutional symptoms present during the period of maturation (or concoction) vary greatly in severity. When the pustules are numerous, there is both general fever and local irritation; the pulse is accelerated; the nights are restless; the urine is scanty and high-coloured; frequently there is delirium, especially at night. Much, however, will depend on the quantity of eruption, the habits of the patient, and the circumstances under which he is placed. If the habit of body be good, the blood of healthy quality, without plethora; if the season be mild, the apartment cool, and the diet carefully restricted; if, lastly, the mind of the patient be tranquil, a large mass of eruption may maturate with a very moderate degree of fever. In many cases, however, there is great local irritation; the skin is often so tender as to occasion the utmost distress; frequently there is great itching of the surface, so that the patient is with difficulty restrained from scratching and abrading the tender vesicles; the face is often swelled, and the eyelids closed during the three or four days which precede the bursting of the pustules. A similar swollen condition of the hands is often productive of great inconvenience. Throughout the whole period of maturation, but especially at the height, the surface of the body throws out a peculiar faint and sickly smell, quite peculiar to this disease.

Stage of desiccation and decline. On the eighth day from the appearance of eruption, the inflammatory areola subsides, and the ripened pustules having burst and discharged their contents, are succeeded by scabs which dry up, and in a healthy state of constitution fall off in the course of four or five days. In mild cases, where the full process of pustulation is not gone through, many of the vesicles become shrivelled, and form only imperfect and scaly crusts. Occasionally these imperfect scabs may be seen intermixed with the scabs of well-developed pustules; and it often happens that, on the lower extremities, this premature desiccation of the vesicles shall be very general. The phenomenon has been attributed almost universally to the absorption of the purulent matter. But it is not so. No matter is formed: the serous fluid secreted during the first days of inflammation does not undergo any further change: it condenses in the serous form; the cuticle over it shrinks; and in this manner a dry scaly crust is formed. About the fourteenth day of eruption, the fever has entirely subsided, all swelling of the face has ceased, the crusts have fallen from the face and upper parts of the body; but the surface of the skin, especially of the face, is left of a reddish brown or vinous tint; and occasionally, where ulceration has succeeded the bursting of the scab, depressions are perceived. The clarety hue of the skin left by small-pox often continues for many months. The pits or depressions (*foveolæ*) are permanent in after life. From the great vascularity of the face, there is always most risk of such disfigurement in that part.

Variola confluens.

The extraordinary difference between the distinct and confluent forms of small-pox have been observed by all authors since the disease was first an object of study. It is not merely that the skin is here more crowded with papulæ, but other features of the complaint are observable, which in the distinct form are absent or scarcely perceptible. The following brief enumeration of the peculiarities of the confluent small-pox will prepare the way for that more detailed investigation which the importance of the subject demands:—1. The eruptive fever is more intense. 2. The regular course of inflammation in the vesicles is interfered with by the immense quantity of papulæ which occupy the skin; the inflammation extends to the subjacent cellular texture. 3. The mucous expansions of the nose, mouth, pharynx, larynx, and trachea, are the seats of eruption equally with the skin; and this complication materially influences the progress and appearances of the cutaneous inflammation. 4. The nervous system participates in the general disturbance. 5. The febrile symptoms continue, and even increase in intensity, from the first appearance of eruption to maturation. 6. The decline of the disorder is accompanied by *secondary fever.*

1. In confluent small-pox the eruptive fever is for the most part very severe; the pain of the back and muscular weakness are excessive; the patient staggers in his walk; the expression of countenance is haggard; at times there is, from the very first, a strongly marked implication of the brain and nervous system; delirium is observed, sometimes fierce, sometimes of the typhomaniacal character, or the patient is comatose; the respiration is laborious; the pulse frequent, small, contracted, or oppressed; and there is constant sickness at stomach. Sydenham (sect. iii. chap. ii.) and other authors have described confluent small-pox as ushered in with diarrhœa, and general irritation of the mucous membrane of the alimentary canal: we have rarely met with this occurrence.

2. The immense number of papulæ thrown out on the surface is undoubtedly the leading feature of confluent small-pox, and one great cause of danger. The extreme vascularity of the face leads often to confluence there, while other parts may be comparatively free. Still the disease is called confluent, and the progress of eruption on the face becomes the index which chiefly guides

the judgment of the physician. Sometimes, however, confluence is confined to one arm, to one leg or foot, or to the breast. These cases are comparatively much less dangerous.

In all cases extreme confluence interferes materially with that due progress of cutaneous inflammation, on which the safety of the patient mainly depends. There is no areola, no central depression. As early as the third day, the face appears covered with a thin cutaneous whitish pellicle, a kind of membranous exudation similar to that which is observed at the bottom of isolated pustules. The inflammatory action thus checked in its regular course, dips inward, and invades the subjacent cellular membrane. The face and head about the third day begin to swell; the salivary glands become involved, and ptyalism sets in, which often continues until the eighth or tenth day. The cellular membrane throughout the body generally, participates (more or less, according to the number of papulæ on the surface) in the same affection. There is tension of the limb, often to a great extent, and an erythematous redness occupies such parts as are free from papulæ. In some aggravated cases buboes form in the groin with intense pain. The scalp is often very tumid, a symptom from which much danger is to be apprehended. Phymosis and paraphymosis, and a swollen state of the scrotum, are attributable to the same general condition of the body. The face about the eighth day presents the appearance of one flat and doughy sore, which discharges a copious thin ichor. An intense pruritus accompanies the formation of the scabs, which often induces patients to tear themselves with their nails. In children especially this is noticed, as the numerous black, bleeding, and excoriated points observable on the face amply testify. Very many patients die between the eighth and twelfth day of the eruption, from the combined effects of cutaneous and cellular inflammation.

3. In almost all cases of confluent small-pox there is an affection of the mucous tissues, which adds largely to the danger. This inflammation of the mucous membranes constitutes an important element in the character of variola, and will require separate examination. The mucous membrane of the nose, mouth, pharynx, larynx, and trachea, are the parts thus affected; the tongue is also implicated; papulæ show themselves on these parts simultaneously with the cutaneous eruption. The mucous vesicles may be distinct, confluent, or semiconfluent; they run the same course as the cutaneous vesicles, coming to maturity, like them, on the seventh or eighth day. The symptoms occasioned by this mucous affection are as follows:— Numerous white points appear on the tongue, palate, and velum pendulum; the membrane of the mouth is red and injected; there is a distressing heat in the mouth, difficulty of swallowing, pain in the throat, sense of stuffing in the nose, hoarseness, and cough; the occurrence of hoarseness marks the implication of the larynx, and its increasing severity may be taken as a just index of increasing danger; the cough is first dry, hard, painful, and tearing; as the disease advances, it is accompanied by mucous expectoration. About the eighth day, a copious viscid secretion takes place from all the affected structures; but in a large proportion of such cases the swelling has by this time extended to the parts about the larynx, and the effused fluids have so blocked up the trachea and air-passages, that respiration is materially impeded, the due oxygenation of the blood interrupted, and suffocation threatened. The progress and aspects of the cutaneous eruption are necessarily modified by this mal-oxygenation of the blood; the areola, on parts at a distance from the heart, is either altogether wanting, or is of a clarety or livid colour; the pustules are every where flat;—they do not fill or acuminate well, even on the neck and breast; the extremities are cold; the tongue is swelled, and of a purple hue. In addition to the increasing dyspnœa, a low muttering delirium is observed, at first present only at night, afterwards permanent through the day; restlessness and anxiety increase; and between the eighth and tenth day from the first appearance of eruption, the patient dies.

4. In a certain proportion of cases of confluent small-pox the brain and nervous system are implicated in a degree far beyond what the general febrile

disturbance would seem to warrant. From the first there is delirium, of that kind called by the old authors *delirium ferox.* It is marked by a strong disposition to self-injury, so that the utmost caution is necessary to guard against accident: restraint is indispensable. Variolous delirium is sometimes accompanied with redness of the eye, contracted pupil, and a wild expression of countenance. The pulse is sharp, and the carotid and temporal arteries beat strongly; but it is seldom associated with plethora, and the loss of blood rarely gives relief. It is often, however, present without any of these evidences of arterial action; it is to be viewed, therefore, as a peculiar affection of the nervous system, the result of the variolous poison in irritable habits. As it ushers in the disease in a certain number of cases, and continues during the first days of fever, so does it almost invariably decline about the sixth or seventh day, when the maturation of the pustules commences. Excessive restlessness, anxiety and despondency of mind, are evidences of the same irritable condition of the nervous system. All these are symptoms of great danger. A large proportion of such cases terminate unfavourably, some by coma, some by supervening erysipelas, some by acute inflammation of an internal organ (the pleuritic surface of the lung in particular) brought on, or determined by, the state of the brain. To this variety of small-pox Burserius and Frank have given the name of *variola nervosa.* Though generally associated with a full and confluent form of eruption, yet this is not essential; and it is sometimes found that intense delirium accompanies, and of course materially aggravates, the danger in distinct and semiconfluent cases.

5. In confluent small-pox the febrile symptoms experience no mitigation on the appearance of eruption. Throughout the whole period of maturation the pulse continues frequent, the skin hot, the thirst great: during the day the patient tosses about the bed restless and uneasy; his nights are passed without sleep, frequently with delirium: there is great weakness of the muscular fibre. As the disease advances to its crisis, symptoms of increasing cerebral irritation manifest themselves; the tongue becomes dry, and is protruded with difficulty and tremor; the stools and urine are passed involuntarily, or the urine is retained in the bladder; subsultus tendinum and picking of the bed-clothes follow, and death takes place, as in cases of typhoid fever implicating the brain.

6. The last peculiarity of the confluent form of small-pox is to be found in the symptoms which accompany the period of desiccation and decline. Many cases, indeed, die between the eighth and tenth days of the eruption; some, as we have pointed out, from affection of the brain; some from extensive disorganisation and destruction of the skin and subjacent cellular texture; some from laryngeal complication, and consequent mal-oxygenation of the blood. But a certain number, partly from original strength of constitution, partly from a less intensity of disease, survive these critical days to enter on a new trial. The restorative process has commenced, but the struggle is attended with great constitutional disturbance, known to physicians by the name of the *secondary fever.*

The *secondary fever* supervenes chiefly in cases where the cellular membrane over the body has become extensively involved with the skin in inflammation, and where the mucous complication has been comparatively mild. Under such circumstances the strongest habits will suffer under the secondary constitutional disturbance; but many children, and some adults of weak habits, fall into it with only a moderate extent of superficial inflammation. The state of the surface therefore, and that of the constitution, are alike to be taken into account, when estimating the probability of its occurrence, and the danger when it has set in.

The symptoms of secondary fever may be thus enumerated:—The surface becomes hot and dry; the pustules hard and scaly; the tongue white; the pulse rapid: the patient gets no sleep, and is tormented with an unextinguishable thirst. The evils of secondary fever, however, do not terminate with these evidences of inward tumult. In almost every case the violence of the fever falls on some one part; and the following is an attempt to classify the usual phenomena:—

1. In a very large proportion of cases the impetus of the fever is thrown

upon some part of the superficies: nor need we wonder that parts, already weakened and prone to inflammation, should be the first to suffer. An efflorescence, identical with scarlatina, occupies the chest, back, or extremities. The tongue is morbidly red, and not unfrequently the throat is red, swollen, and painful. In other cases the cutaneous affection assumes the form of erythema, which in bad cases passes into confirmed erysipelas, with extensive vesications and high constitutional excitement. The head, trunk, and extremities are all equally subject to this kind of attack. Sometimes the cutaneous and cellular inflammation is more circumscribed; boils, abscesses, and carbuncles, occur in the neck, axillæ, groins, elbows, and thighs. In certain cases gangrenous inflammation attacks a large portion of the skin, especially the legs and feet, which in a few days lays bare the subjacent muscles. The same affection frequently shows itself in the first instance on the scrotum and prepuce, runs on rapidly to destruction of the part, and generally ends fatally. In parts exposed to pressure, especially the back and hips, sloughy ulcerations often take place, which from their extent and depth bring life into imminent hazard. In some cases the scalp is affected with diffuse cellular inflammation, and the head is immensely swollen: sometimes very deep-seated parts take on a like action. We have met with abscess beneath the scapula. In some few cases the larger joints fill with purulent matter. The disposition in inflamed parts, during the secondary fever of small-pox, to terminate in the effusion of pus, appears to be universal, and almost uncontrollable. In a certain proportion of cases the surface is occupied with a pustular eruption of the *ecthymatous* kind. It ends in the formation of ulcers pouring out a thin ichor, which heal with great difficulty. The thin cellular membrane under the lower eyelid is the frequent seat of such indolent sores.

2. Another structure which receives the shock of the secondary fever is the eye. Variolous ophthalmia is a subject of great extent and interest, and might claim for itself separate investigation; but as this form of ophthalmia is fully considered in works on ophthalmic surgery, we shall only offer a few details, the result of our own observation.

Variolous ophthalmia is often stated to arise from pustules on the cornea formed at the same time, and in the same way as pustules on the skin. This however is an error. Ophthalmia indeed sometimes attends the early stages of small-pox, but it is common conjunctival ophthalmia. Pustules of a true variolous character do not form upon the conjunctival membrane: they may be traced just within the inner edge of the palpebræ, but not beyond it. The true variolous ophthalmia, by which sight is so frequently destroyed, is a *sequela* of small-pox; an incident in the progress of secondary fever, and almost always coincident with abscesses or extensive destruction of the surface in some distant part. It is an intense form of ophthalmia, setting in generally about the tenth day, and rapidly involving in destruction, more or less complete, some one or all the tissues of the eyeball. There is, first, sloughing of the cornea, followed by staphylomatous protrusion of the iris. In other cases the cornea thickens and becomes opaque, but by degrees, and in the course of two or three years, recovers entirely, or more or less completely, its transparency. Sometimes the whole ball of the eye takes on rapid and violent inflammation, and is converted into one immense protruding abscess. It is comparatively rare to meet with more than one eye involved in this destructive form of inflammation; but in all countries, and from the very earliest periods at which we read of small-pox, we meet with cases of total blindness ascribed to this disease. Not more than three cases of total blindness have left the Small-pox Hospital in the course of the last twenty years. Several other cases of double destructive ophthalmia have indeed occurred, but they all proved fatal from the severity of the accompanying disorders.

3. It is not to be supposed that fever, such as that we are now treating of, can rage without occasionally affecting the interior of the frame. The brain sometimes suffers. Children are observed to grind their teeth, and squint. By

degrees the symptoms of cerebral inflammation are developed, and the child dies either in an epileptic fit, or in the state of coma. Adults may also occasionally be seen labouring under true phrenitis; and some, of plethoric habit, about the eleventh or twelfth day, become lethargic and ultimately comatose, vascular congestion having taken place in the brain. There is another condition of the brain and nervous system not unfrequently observed in the progress of secondary fever. It is identical with that which accompanies the destruction of large portions of skin by fire, and which is familiar to surgeons as the consequence of extensive burns and scalds. The symptoms are severe and repeated rigors, followed by general tremors, low delirium, a quick, thready, and tremulous pulse, a dry brown tongue, collapse of the features, cold extremities, subsultus tendinum, and death.

4. In a certain number of cases the thoracic viscera suffer while the system is labouring under secondary fever, and the pleura (costalis and pulmonalis) is the structure which usually takes on diseased action. No obvious cause can be assigned for the occurrence of variolous pleurisy in the majority of cases. It often sets in most unexpectedly between the seventh and fourteenth days of eruption. In general its course is very rapid, terminating fatally on the third or fourth day. We have seen it prove fatal in thirty-six hours. The symptoms are for the most part very urgent and unequivocal. There is agonising pain of the side, extreme dyspnœa, with a hard, wiry, and incompressible pulse. The patient dies in great suffering, and on dissection the corresponding cavity of the chest is found filled with pus, or a sero-purulent fluid. In other cases the symptoms are less violent, presenting at first the characters of pleurodyne or thoracic rheumatism. It is, however, to be kept in mind, that variolous pleurisy is sometimes unattended by prominent local symptoms. The disease is chronic and latent. Auscultation alone detects its existence. We have seen cases where acute rheumatism and hernia humoralis formed the only urgent symptoms during life, but on dissection one cavity of the chest was filled with pleuritic effusion. This will serve to show the importance of a careful and accurate exploration of the chest in all suspected and doubtful cases; though it is right to add, that these insidious internal inflammations, occurring while the system is labouring under intense fever, hardly admit, even if detected during life, of effectual relief from any mode of treatment.

The substance of the lungs has been found, in some few cases of secondary fever, to have been the seat of acute inflammation. Children are often attacked with symptoms of croup, and elderly persons are sometimes carried off by laryngitis. These cases are, however, very rare.

5. The abdominal viscera are, in a very remarkable manner, exempted from the ravages of small-pox. Sometimes we see children, in the course of secondary fever, labouring under the common subacute form of muco-enteritis, the belly tender, the stools ejected with force, the tongue red and aphthous. In a few cases the peritoneal surface of the liver may be observed taking on inflammatory action; but the abdominal complications present no peculiar features, and require no specific notice.

6. The decline of small-pox is frequently mixed up with other evils not flowing from the same source, but arising either from the peculiarity of the patient's habit, or the circumstances under which he is placed. Thus it is that small-pox is so frequently seen at this period of its course conjoined with scrofula. Nothing serves so certainly to call into activity the dormant seeds of scrofula as an attack of small-pox. Accordingly, we find the period of convalescence protracted by strumous ophthalmia, known by the complete intolerance of light, the forcible closure of the eyelids, the abundant secretion of tears, and an obstinate resistance to every kind of remedial treatment. We find in like manner, at this period, enlargements of the cervical glands, which sometimes suppurate, but more often continue hard, indolent, and intractable. Severe otitis arises in such habits from accidental exposure to cold. Scrofula de-

velops itself in the joints or invades the bones. It happens but too often, that the seeds of tubercle and pulmonary phthisis are laid during the progress of small-pox, and especially when the secondary fever has been severe and tedious.

Lastly, the decline of small-pox may be complicated with fever of a different character, attributable, not to the variolous poison, but to some miasm generated by the accumulation of malignant cases, and received into a system already weak and exhausted. To this source some part of the mortality in all hospitals devoted to the reception of small-pox must in fairness be attributed. Vitiation of the air is almost inseparable from the nature of an hospital, and the offensive exhalations from the surface in small-pox are pre-eminently calculated to generate a noxious febrific miasm. Hospital fever, as it may well be called, thus originating, attacks all persons within its influence. It shows itself under the following aspects:—1. Typhus fever; 2. Erysipelas; 3. Inflammation of the mucous membrane of the throat and of the subjacent cellular membrane; 4. Hospital gangrene. One or more of these very formidable complaints may attack persons during the secondary fever of small-pox, or as they gradually emerge from it. It is unnecessary to say how fearfully the danger of the patient is thereby increased. The mildest forms of small-pox are not exempt from this additional calamity.

Having now described the two principal varieties of small-pox, we proceed to explain the distinctive characters of certain others which have been noticed by authors, and to which specific appellations have been attached. We shall enumerate them in the following order:—1. *Variola semiconfluens*; 2. *Variola corymbosa*; 3. *Variola maligna*; 4. *Variolæ anomalæ*; 5. *Variola confluens mitigata, sive Variola verrucosa*; 6. *Variola varicelloides*; 7. *Febris variolosa sine eruptione.*

Variola semiconfluens.

The semiconfluent variety of small-pox is intermediate between the distinct and the confluent, partaking sometimes of the mildness of the one, sometimes exhibiting many of the worst features of the other. It is difficult to offer any adequate explanation of these differences. Much depends on the constitution of the patient, something upon age, something too upon the condition of the mind.

Variola corymbosa, or Coherent Small-pox.

This term, as we have said, is applied to cases of partial confluence, that is, to cases where the vesicles are grouped into clusters, leaving intermediate spaces of unoccupied skin. Most of these partake of the general character of confluent small-pox. It often happens in this form of the disease, that the maturation is imperfect. Instead of well-formed vesicles, blebs or bladders form, which fill with a thin semipurulent fluid. Many of these cases run into secondary fever. Erythematous inflammation succeeds, probably in consequence of the imperfect concoction of the matter; and ulcers, followed by deep pits and eschars, are the unavoidable result. Much irregular fever accompanies the coherent small-pox. The cellular membrane is less extensively affected than in the thoroughly confluent variety.

Variola maligna.

The distinctive characters of this truly formidable variety of small-pox have been acknowledged in all ages. To the usual phenomena of the disease are superadded those which indicate a dissolved or putrescent state of the blood. This implication of the fluids of the body gives to the small-pox a character well-designated by the word *malignant.* The term *petechial small-pox* is equally appropriate. The evidences of malignity are perceptible in

some cases from the first moment of febrile invasion. At other times they are perceived only when the eruption begins to develop itself. The initiatory fever is sometimes attended with petechiæ, large patches of subcutaneous ecchymosis (called vibices), or with hæmorrhage from the nose, mouth, stomach, bowels, or uterus. The aspect of countenance is squalid, the urine dark-coloured, the breathing anxious, hurried, and irregular. Under these circumstances death has taken place prior to any unequivocal appearances on the skin. That such a disease is undeveloped small-pox must always remain a matter of some doubt; but the fact can often be inferred from a careful investigation of the prior history. It will be found, for instance, that the patient had never previously undergone small-pox; that he had been exposed to small-pox infection within that reasonable limit of time which affords presumptive proof; or lastly, that he may himself, in turn, have communicated small-pox to others. Many cases considered to be idiopathic malignant fever proving fatal at an early stage, are in reality cases of undeveloped variola maligna.

During the maturative stage, malignant small-pox is characterised by the same kind of mucous and subcutaneous hæmorrhages. The gums bleed, and often very profusely; there is bleeding from the nose, spitting of blood, vomiting of blood, and the passage of blood by stool. Menorrhagia displays itself in females, and abortion scarcely ever fails to occur in such as are pregnant. The fœtus dies in utero. As the disease advances to maturation, the vesicles fill, not with pus, but with a bloody ichor. Livid spots or petechiæ are interspersed among them. The eye is frequently the seat of extensive ecchymosis. This variety has been called the black pock (*variolæ nigræ*). The malignant form of small-pox is generally found associated with confluence of eruption, both on the skin and mucous membranes. Sometimes, however, the eruption is of the semiconfluent or coherent kind, and, more rarely still, distinct. Though delirium generally exists, it is yet by no means uncommon to find the mind perfectly clear throughout the whole course of petechial small-pox. This most aggravated state of the disease scarcely offers any reasonable ground of hope. Death usually takes place between the fifth and seventh days from the first appearance of eruption, nature showing little or no disposition to forward the maturation of the pustules. We have seen death take place under these appalling circumstances, with the intellect quite unimpaired.

Variolæ anomalæ.

Under this head authors have arranged a variety of singular anomalies and rare complications. It were a vain and profitless task to enumerate them all, but some of the more common, and a few of the most rare, may advantageously be mentioned. Small-pox may occur to persons who, at the time of seizure, are labouring under some other malady, such as bronchitis, hooping-cough, pneumonia, phthisis, or other pulmonary disease. The complication of small-pox with an acute or subacute form of bronchitis is very common during the winter months in this country, and it demands in almost all instances the treatment appropriate to the concurrent disorder. Small-pox may occur simultaneously with measles (De la Garde, *Med. Chir. Trans.*, vol. xiii.), scarlet fever, and cow-pox. It may occur to persons of exceedingly weak habit of body, either constitutional or induced by long prior illness, such as a severe typhus fever. Under these and similar circumstances of extreme debility, we notice tardiness of eruption, colapse without advance of eruption, an abundant formation of large blebs, a tedious and hazardous period of convalescence.

Among the anomalies of small-pox, we may enumerate its occurrence in the African negro, whose peculiar constitution of skin prevents the development of areola.

Lastly, we may specify among the rarer occurrences the appearance of

small-pox in the fœtus at birth, showing that it must have imbibed the germ of the disorder, and gone through its earlier stages in utero. (Jenner, *Med. Chir. Trans.*, vol. i.) In the case recorded by Jenner, the mother experienced no indisposition herself. Mead entertained the fanciful notion, that persons who showed in after life a complete insusceptibility to small-pox, might possibly have passed through the disease in the fœtal state. (Mead, *on Small-pox*, chap. iv.)

Variola confluens mitigata.

A rare variety of small-pox was described by Van Swieten and others under the title of *Stone-pock, Horn-pock, and Wart-pock* (*Variola verrucosa*, or *cornea*). This is now very frequently observed, it being one of the many forms in which small-pox shows itself after vaccination. The initiatory symptoms are generally urgent. The eruption is abundant over the whole body, and often the aspect of the disease, for the first two or three days, is very unpromising. On the third or fourth day, however, a modification or mitigation of symptoms manifests itself. The vesicles shrivel, and a few only attain an imperfect maturation. The greater number harden, and are converted on the sixth day into small tubercles, which gradually disappear. The febrile symptoms rapidly subside, and the patient, in less than a fortnight, is free from any perceptible complaint, except, perhaps, some weakness of the eyes. The absence of secondary fever is the great characteristic of this variety of small-pox. One of the peculiarities of the variola confluens mitigata, is the unequal advance made by the papulæ on the same portion of the surface: on the face, or on the arm for instance, pustules rapidly maturating, others of smaller size dying off, and some becoming tuberculated, with little or no surrounding inflammation, may be perceived at one and the same time. This mitigated form of small-pox, now so common among the vaccinated, is still occasionally seen in persons who have never been vaccinated. Such mildness is attributable either to the general character of the epidemic, or to the idiosyncrasy of the individual. His system receives the small-pox in the first instance, perhaps, with alarm, but ultimately eliminates it with ease and safety. One of the remarkable effects of cow-pox is to create, *artificially*, a constitution thus favourably disposed towards small-pox. It multiplies the cases which our ancestors saw, and described under the name of variola verrucosa.

Variola varicelloides (the umbilicated pustular Varicella of Rayer).

This is the mildest form in which small-pox is ever seen. The initiatory symptoms are never urgent; in some cases they escape observation. The eruption shows itself on the third day from the invasion of fever. This circumstance will afford useful aid in determining the character of the disease, and distinguishing it from varicella vera, with which it is so liable to be confounded. In the true varicella, the eruption shows itself, for the most part, without any prior symptoms, or, at least, within twenty-four hours from the occurrence of a slight febrile commotion. The diagnosis is completed by observing the grouping of the papulæ, and their construction. When the disease is truly variola, the pimples never fail to show (either with or without the aid of the microscope) central depression. This great and undoubted criterion of variolous origin cannot be present, unless the morbid germ had lain dormant in the system during the long period necessary for such a development. A crop of vesicles may, indeed, be thrown out on the surface after a brief period of incubation; but such vesicles are mere elevations of cuticle (minute blisters in fact), presenting no regular organisation. Such is the pathological character of genuine varicella, or chicken-pox. In some cases the resemblance between the variola varicelloides and chicken-pox is so close, the febrile commotion so trifling, and the progress of the disorder so rapid, that doubts may reasonably exist as to the real nature of the complaint. None but those who are in the constant habit of seeing such cases, of tracing them to their source and of observing the minute gradations

by which nature connects the severe and mitigated forms of small-pox, could recognise, in a few scattered papulæ over the face and arms, the same disease which, in another form, bids defiance to every effort of human skill, and hurries its victim to a premature grave. This variety of small-pox, singularly mild as it is, was known to physicians before the time of Jenner. It is clear, from the perusal of Dr. Heberden's paper on chicken-pox, published in 1767, that such a complaint was well-known to him; and that it gave occasion then, as now, to diagnostic doubts and difficulties. Since the discovery of vaccination, these cases of variola varicelloides have multiplied prodigiously, and are now familiar to all.

Febris variolosa sine eruptione.

Sydenham entertained the opinion, that during years when small-pox was epidemic, a variolous fever was also to be met with, which showed no eruptions. He devotes a chapter (sect. iii. chap. iii.) expressly to the consideration of this disease. Our views regarding the pathology of small-pox have undergone a material change since the time of Sydenham, and the notion is now generally considered fanciful, but as it has received the sanction of some later writers (*Burserius, Vogel, P. Frank, De Haen, Fouquet, Gatti, Hedlund*), we may offer a few observations concerning it. The circumstances that induced Sydenham to connect a particular form of fever with small-pox, were the following:— 1. It appeared in years when small-pox was epidemic; 2. It was ushered in by the same tenderness of the epigastrium which distinguishes incipient variola; 3. It was accompanied by petechiæ, salivation, profuse spontaneous sweats affording no relief, and other symptoms observable in a regular small-pox; 4. It was benefited by the same cooling system of treatment. M. Hedlund of Hernœsand, during the Swedish epidemic of 1824, states (Magendie, *Journ. de Physiologie*, tom. vi.), that three different forms of disease were then observed, all, as he believes, pathologically allied, viz. true small-pox, the varioloid, and a fever without eruption. This fever, he adds, began and ended at the same time with the epidemic. The early symptoms were identical with those which preceded the variolous eruption. He considered it as a mild undeveloped small-pox. The numbers attacked with this eruptionless fever, constituted the third part of the whole number attacked during the epidemic. "Perhaps," says M. Hedlund, "small-pox has the power of engendering an epidemical constitution, which influences other maladies reigning at the same period." Some authors of less note have even fancied that such variolous fevers have given subsequent immunity from small-pox. We have met with cases which bear out the notion of a mild variolous fever without developed eruption; and as the identity of a highly modified varioloid fever with true small-pox is admitted, so would it be wrong to discountenance entirely the notion of a *febris variolosa sine eruptione*.

Diagnosis of small-pox. Before the appearance of eruption, the diagnosis of small-pox is always liable to uncertainty, even with every attention to the character of the prevailing epidemic, for the precursory symptoms are common to other diseases. The grounds on which we attempt, at this early period, to determine the nature of the approaching disorder are, 1. The suddenness of the attack; 2. The absence of previous ailment; 3. The exposure to variolous contagion; and, 4. The having previously undergone one or more of the exanthemata. The diseases with which, after the occurrence of febrile eruption, small-pox may be confounded, are measles, febrile lichen, varicella, and secondary syphilis.

1. The papulæ of true small-pox are firmer than those of measles. They feel granular, like hard bodies, under the finger. In measles too there is accompanying cough, and watering of the eyes. Further, forty-eight hours elapse in small-pox, from rigor to eruption; seventy-two hours in measles. 2. Febrile lichen is the disease from which small-pox, at the onset of eruption, is with most difficulty distinguished. The aspect of eruption is in both cases nearly alike. The surest and safest grounds of diagnosis are based on the interval which has elapsed from rigor to eruption, and the seat and extent of eruption. In febrile

lichen twenty-four hours elapse from sickening to eruption; in small-pox, as we have said, forty-eight. Small-pox almost always appears first on the face; the eruption of lichen is equally developed, from the first, on the trunk and head. 3. The diagnosis of small-pox and chicken-pox has been already pointed out. 4. There is a form of secondary syphilis, in which an eruption appears on the face and trunk very similar to distinct small-pox. This eruption passes through the several grades of papula, vesicle, and pustule. It is preceded by a febrile attack of variable duration. The circumstance has in many instances given rise to the notion of small-pox occurring twice. A case of this kind fell under our own observation very recently. The diagnosis is to be effected by accurate inquiry into the prior history of the case, and the further progress of the eruption. The pustular syphilitic eruption runs a tedious course, exceeding ten days; and the pustules are developed, not simultaneously as in small-pox, but in successive crops.

Prognosis. The danger in small-pox is dependent on a variety of circumstances, but chiefly on the following:—1. on the quantity of the eruption; 2. on the condition of the mucous membranes; 3. on the state of the fluids; 4. on the state of the nervous system; 5. on the age of the patient; 6. on his habit of body; 7. on the circumstances in which he is placed, and the treatment adopted.

1. Distinct small-pox is a disease of little or no danger. Confluence is always unfavourable, especially on the face; nor is the nature of the danger always understood. A confluent case shall sometimes appear to progress favourably, when unexpectedly a convulsive fit occurs, and the patient is destroyed. The drain which confluence necessarily occasions in the system is sometimes the obvious cause of danger. Nevertheless, if the pustules on the extremities acuminate well, and are surrounded by a crimson areola, a good ground of hope exists. If the vesicles on the trunk and extremities, on the other hand, be flat, with a clarety areola, while the eruption on the face is white and pasty, no reasonable hope of recovery can be entertained.

2. The condition of the mucous membranes, especially that of the larynx, is equally important with reference to prognosis. Hoarseness at an early period of the disease is always unfavourable. A natural tone of voice, again, is a good omen, even though the eruption be full and confluent, with a disposition to cellular inflammation. The appearance of the mouth and throat will also serve as a useful guide to the probable state of the larynx and trachea.

3. The condition of the fluids is a circumstance by which the physician will in a great degree be guided in his prognosis. Every thing which indicates malignancy and putrescency is highly unfavourable. Petechiæ, menorrhagia, mucous hæmorrhages, and vesicles filled with a bloody ichor, are therefore among the worst signs that can occur. Recovery from the petechial small-pox has been recorded, but it is among the rarest events which the history of this disease presents.

4. A tranquil state of the brain and nervous system is particularly favourable, and is the circumstance to which the recovery of all severe confluent cases is mainly attributable. Quiet nights, composure of manner, a contented disposition, and confident hope of recovery, are good signs: restlessness on the other hand, a continual moaning, despondency of mind, and a succession of sleepless nights, afford but little hope of recovery. Children who grind their teeth seldom do well.

5. Age is a point of great moment in estimating the comparative degree of danger in confluent and semiconfluent cases; the extremes of life are those on which small-pox always falls the heaviest. Persons above forty years of age seldom recover even from semiconfluent small-pox; infants are in danger even from a moderate quantity of eruption: in both, the process of cicatrisation is attended with great exhaustion of nervous power, the result of which is, that some internal organ necessary to life (the larynx, brain, or lungs) takes on acute and rapidly destructive inflammation. The arteries here act without the

due control of the nerves. The most favourable age for taking small-pox is from the seventh to the fourteenth year, when the powers of life are in full vigour, without the risk of plethora.

6. The habit of body is of course also to be taken into account. Small-pox is always aggravated by its concurrence with a *plethoric* habit. Great constitutional debility is equally to be dreaded. In the strumous habit the sequelæ of small-pox are peculiarly severe, and often bring life into danger after the crisis has been passed.

7. The probability of recovery must depend, lastly, upon the circumstances under which the patient is placed; on the possibility of applying remedial measures effectively; on the treatment which has been pursued in the early stages, and other contingencies which scarcely admit of enumeration. In hospitals the danger of contracting fever and erysipelas during the later stages is never to be lost sight of. In private life, small rooms, superabundant bedclothes, and ill-timed cordials, may aggravate or bring on local congestions and inflammations, from which the hospital patient is exempted. In certain seasons and states of the air, small-pox is more to be dreaded than at other times.

These principles of prognosis will lead naturally to the consideration of the average mortality in small-pox, the usual sources of death, and the morbid appearances.

Mortality. The average mortality by small-pox is usually stated as one in four of those attacked, or twenty-five per cent. At the Small-pox Hospital the extremes have been fifteen per cent. and forty-two per cent. The average of twenty-five years prior to the introduction of vaccination gave thirty-two per cent. The proportion which the mortality by small-pox bears to the total mortality in any town or district, has been a favourite subject of inquiry with all writers on medical statistics. Prior to 1800, that is, before the period when vaccination influenced the results, the deaths by small-pox were to the total deaths, both in town and country, as 16 to 100. It was observed by all writers, that in the unprotected the greatest mortality takes place in the early periods of human life. Dr. Haygarth computed that at Chester, in the latter part of the last century, one half of the deaths in children below ten years of age was due to small-pox. The mortality is heaviest from the second to the fifth year. From the First Report of the Registrar General of England, it appears that in 1837 there were only five diseases more fatal in England than small pox, and that the deaths throughout England and Wales by that disorder amount now annually to about 12,000.

Small-pox may prove fatal at any period from the first invasion of fever to the fortieth day. Death may even take place prior to the development of eruption; but such cases are rare. In all countries it has been observed that the eighth is the day of greatest danger, and the second week that which exhibits the greatest amount of mortality. The annexed table, extracted from the records of the Small-pox Hospital for 1828-9, showing the period of eruption at which 168 patients died, and the days on which the disease proved fatal, illustrates this, while it points out how little importance can be attached to the doctrine of critical days in small-pox.*

* Of 168 fatal cases of Small-pox there died on the

1st week. Days.	Cases.	2d week. Days.	Cases.	3d week. Days.	Cases.	4th week and later. Days.	Cases.
3d	1	8th	27	15th	7	22d	3
4th	5	9th	15	16th	5	23d	1
5th	10	10th	14	17th	3	24th	3
6th	5	11th	16	18th	3	25th	1
7th	11	12th	11	19th	1	27th	1
	32	13th	11	20th	2	28th	1
		14th	5		21	29th	1
			99			31st	1
						32d	1
						35th	1
						38th	2
							16

The mortality varies of course with the character of the eruption. The subjoined table shows the proportion in which each variety of small-pox proved fatal at the Small-pox Hospital during the epidemic of 1838.*

The concluding table will complete this branch of the subject by pointing out the comparative mortality of small-pox at different ages, distinguishing the vaccinated from the unvaccinated.†

The immediate causes of death in small-pox are various, as the preceding detail of symptoms will have shown, but it may be useful to exhibit them in a condensed form : — 1. Prior to the maturation of the pustules (that is, from the invasion of fever to the seventh day of eruption), small-pox proves fatal by that general derangement of the system which occurs in *malignant fever.* Such a condition of the body is well designated by the term *acute malignancy.* 2. During the second week of eruption, the chief cause of death is to be found in affections of the larynx and trachea, and consequent suffocation. 3. During the third week, that is, during the stage of secondary fever, death may happen either by general excitement leading to effusion in the brain, or by supervening pleurisy, pneumonia or laryngitis; or, lastly, by extensive sloughy or gangrenous destruction of the skin. 4. During the fourth week, and at still later periods of the disease, death may take place from mere exhaustion, or it may be the result of erysipelas, or of some other disease excited by the small-pox, or engendered by that constitutional debility which such a disorder in any of its severer forms so frequently leaves.

Anatomical characters. Small-pox offers the only instance of a constitutional disorder which has for the immediate cause of death the condition of the surface. Extensive burns and scalds afford in the practice of the surgeon abun-

* TABLE exhibiting the comparative Mortality in the several Varieties of Normal and Abnormal Small-pox at the Small-pox Hospital, during the Epidemic of 1838.

	Unprotected.		Vaccinated.	
Normal Small-pox.	Admitted.	Died.	Admitted.	Died.
Confluent - - -	295	149	56	21
Semiconfluent - - -	78	8	42	4
Distinct - - -	19	0	20	0
Total Normal -	392	157*	118	25
Abnormal Small-pox.				
Confluent modified - -	2	0	38	4
Semiconfluent modified -	1	0	28	1
Varicelloid - - -	1	0	114	1
Total Abnormal -	4	0	180	6
Grand Total -	396	157	298	31†

* Of these there died of fever and superadded erysipelas, 14.
† Of these there died of fever and superadded disease, 10.

† TABLE exhibiting the Mortality of Small-pox at different Ages, and under different Circumstances, as displayed at the Small-pox Hospital of London, in the Epidemic of 1838.

Ages.	Unvaccinated.		Vaccinated.	
	Admitted.	Died.	Admitted.	Died.
Under 5 years of age - -	42	20	0	0
From 5 to 9 inclusive - -	37	11	5	0
„ 10 to 14 „ - -	30	8	25	0
„ 15 to 19 „ - - - -	104	32	90	6
„ 20 to 24 „ - -	115	50	106	16
„ 25 to 30 „ - - -	45	23	55	8
„ 31 to 35 „ - -	12	7	13	1
Above 35 years of age. - -	11	6	4	0
Total -	396	157	298	31

dant opportunities of witnessing the excessive constitutional disturbance occasioned by the destruction of large portions of skin, and death so brought about. The physician sees it only in the case of small-pox. In many instances, the state of the surface is the sole cause of death. In others, the disorganisation of the mucous tissues has gone on *pari passu* with the superficial injuries. In a third set of cases, serious lesions of internal parts are observed, but many of these are the mere consequences of the cutaneous disorganisation, and of the impediments to transpiration thereby occasioned.

The condition of the surface after death by confluent small-pox has been described with considerable accuracy by many authors, but by no one has the subject been so minutely examined as by Dr. Petzholdt of Leipzig, who derived his experience from an epidemic which prevailed in that town in the winter of 1832-33.* It is by examination of the skin after death, that modern pathologists have obtained that insight into the structure of the variolous pock, and the changes produced on the several parts of the cutaneous tissue in the further advance of the disease, which have been already noticed. The base of each pock presents, in almost all instances (except in the palm of the hand and sole of the foot), a small depression or aperture, formed by the rupture of the excretory duct of a cutaneous gland. The portion of cutis not occupied with pocks is loaded with a white puriform matter, which, as in the case of the pustules, wedges itself in between the bundles of vessels. At an early period of disease, the undermost layers of the epidermis are in a softened state. At a later period, its connection with the cutis is altogether destroyed. The cutaneous glands are always more or less swollen, so as to assume a pyriform shape, and their excretory ducts are frequently much distended by the secretion of the glands, which are always found more vascular than in their healthy state. The epithelium of the tongue and mouth is much softened. The subjacent mucous membrane frequently exhibits erosions varying in depth. The mucous follicles of the tongue and tonsils are observed to be greatly distended, and their mouths to gape so widely as to admit readily the entrance of a large probe.

The appearances of most importance are those presented by the mucous surfaces of the larynx and trachea. In all severe cases implicating those structures (provided death takes place prior to the twelfth day) the marks of destructive inflammation in them will be apparent; that is to say, the membrane appears deeply congested with blood, and covered with a copious viscid purulent or puriform secretion of a grey or brownish colour. On detaching this, the membrane itself appears thickened, pulpy, and in the worst cases black or sloughy. A closer examination of the parts affords the following appearances. The surface of the epithelium exhibits, in an early stage of the disease, a number of dim spots of a round form, and of the size of lentils, produced by the exudation of a fluid between the epithelium and the subjacent mucous membrane. In the further advance of the disease, this effusion becoming more copious raises the epithelium, which may then be stripped off, exposing the inflamed and sometimes ulcerated mucous membrane. The diseased appearances of the trachea are not always uniformly diffused over the whole surface, though the epithelium is easily separable even from the unaffected parts. The ulcerations vary both in number and depth, extending sometimes to the submucous cellular texture. Disorganisation of the bronchial mucous membrane may be traced into the third series of branches.

The œsophagus has been found in some instances to be studded with minute elevations, which have been described as pocks. This appearance is very rare. The lungs exhibit, in some cases, the usual evidences of inflammatory action, viz. vascular engorgement, purulent infiltration. and hepatisation; but the chief ap-

* Die Pocken-krankheit mit Racksicht auf die Pathologische Anatomie. Leipsig, 1836. A copious analysis of this work, in as far as relates to the morbid anatomy of small-pox, may be found in the *Brit. and For. Med. Rev.* vol. v.

pearances within the chest are those presented by the serous membrane. The pleura of one side (rarely, if ever, of both sides) is found to exhibit the marks of recent and perhaps of very intense inflammatory action. It appears highly injected with blood, and covered with a thick layer of coagulable lymph, while in the corresponding cavity of the chest there is abundance of sero-purulent fluid, resembling cream and water, with shreds of lymph floating in it. In many cases, so copious is the inflammatory exudation, as to fill completely one side of the chest, and to compress the lung of that side into a very small space.

In the cranium the morbid phenomena observable in small-pox present no features of peculiar interest. In persons cut off by convulsion or coma, the same appearances may be found as under like circumstances where no affection of the surface is present. A general vascularity of the brain and its enveloping membranes will probably present itself, with some effusion of turbid serum between the membranes, or in the ventricles, or in the theca vertebralis.

Much difference of opinion has prevailed regarding the abdominal appearances met with in those who die of small-pox. Sir Gilbert Blane has recorded a case wherein the mucous membrane of the bowels is reported to have been occupied with small round ulcerated spots. Many pathologists have expressed their belief that true variolous pustules have been found in the gastro-enteric mucous membrane. Others, again, among whom may be mentioned Cotunnius, Wrisberg, and Reil (who have paid great attention to the subject), are of opinion that this structure is incapable of developing variolous pustules, and that the appearances so described are in reality inflamed, enlarged, or ulcerated follicles, with petechial patches, similar in all respects to what are found in the common forms of idiopathic or typhoid fever. This pathological principle is fully borne out by the experience of the Small-pox Hospital. We may add, however, that even these appearances are very rare, and that the freedom of the abdominal viscera from urgent symptoms during life, and from all trace of disorganisation after death, is a remarkable feature in the disorder. Inflammation may, indeed, originate from accidental causes in any internal organ during the progress of small-pox, and its effects will be seen after death; but these are not to be confounded with the specific and acknowledged effects of the variolous poison upon the skin and mucous membranes of the throat and chest.

Causes. The phenomena of small-pox being thus described, we proceed to investigate its causes, to unfold what is known regarding its mode of origin and propagation, and the circumstances under which it most commonly displays itself. The notions entertained on this subject at the present time differ most materially from those which prevailed at an earlier era of the world, and are perhaps still susceptible of improvement. For more than a thousand years after the first appearance of small-pox, it was believed by all physicians to originate like other fevers; that is to say, either from some vitiated state of the fluids of the human body, or from some peculiar state of the atmosphere. To this day a large portion of mankind believe that small-pox may be *bred in the blood*, independent of all external agency. Boerhaave adopted the notion that small-pox was in all cases the product of a specific poison, miasm, or contagion derived from some one already labouring under the malady. This opinion strengthened during the latter part of the last century, until at length Dr. Haygarth, Dr. Jenner, and others promulgated the notion that, by a system of quarantine and other measures of precaution, the small-pox might be utterly banished from the earth. The latter opinion is now acknowledged to be doubtful in theory and utterly visionary in practice; but a belief that small-pox is in all cases the result of a contagion received from without, is adopted by all the best pathologists and practical physicians of the present day. It would certainly be difficult to support the doctrine of spontaneous origin by arguments which would be generally received; but while we admit the hypothesis of contagious origin, we must not shut our eyes to the importance of the facts which connect small-pox with other epidemic maladies, such as the Egyptian

plague, malignant cholera, influenza, and hooping-cough, where the notion of contagious origin is only partially admitted. To understand the origin and propagation of small-pox, therefore, it must be viewed not only as a contagious, but as an epidemic disorder.

1. *Contagious origin of Small-pox.* The contagion of small-pox emanates from the human body at every period of the disease, from the first invasion of fever to the throwing off of the latest scabs. Heberden and Haygarth affirmed, that during the initiatory fever, and for the two or three succeeding days, a patient seldom, if ever, communicated the infection. But this is incorrect. The dry scabs of small-pox retain the contagious property for a great length of time. Experience, too, has shown, that for a considerable time after death the matter of the pustules continues energetic, and that a confluent case will taint the air and spread the disease for at least ten or twelve days after death. (Hawkins, *Lond. Med. Gaz.*, vol. iii.) Nothing is better ascertained regarding the contagion of small-pox, than the fact, that the kind of disorder produced bears no certain relation to the kind or intensity of the case producing it. A confluent case shall give origin to a varioloid, and a mild distinct case shall generate a confluent and malignant one. The circumstances that determine severity in any individual case, whether of small-pox or of any other exanthema, are very little known to us. The following is only an imperfect attempt to illustrate this problem in the history of small-pox.

The quantity of eruption is sensibly influenced by the state of the surface at the period of its development. Whatever tends to augment the cuticular circulation, increases confluence, such as the warm bath, abundant bed-clothes, strong diaphoretic and sudorific medicines, wine and cordials, and great heat of the apartment. All local irritants, such as blisters, mercurial inunction, and plasters, favour confluence in parts to which they have been applied. Cold represses the number of papulæ, though not so certainly as heat favours them. Active purgatives taken during the incubative stage lessen the extent of cutaneous inflammation. A plethoric state of body increases the intensity of the disorder, and is mainly instrumental in occasioning cellular complication. An irritable condition of the nervous system gives occasion to that conjoined affection of the brain and nerves which authors have called *Variola nervosa.* Extreme weakness of body appears often to be the direct cause of that dissolved state of the fluids which we call acute malignancy; but not always, for malignancy, as Huxham well observed, is compatible with plethora. Lastly, it may be remarked that there exists in certain individuals, and not unfrequently in many members of the same family, a peculiar irritability under the influence of the variolous contagion. They receive it with alarm, they develop it with pain, and get rid of it with difficulty. Such constitutions may truly be said to be *poisoned* by it. Again, other persons imbibe the morbid germ mildly, nourish it without suffering, and eliminate it safely and kindly. All this is referable to idiosyncrasy.

The variolous contagion is capable of attaching itself to fomites, more especially bed-furniture, clothes, and bedding. These, if closely wrapped up and secluded from the air, will retain the matter of the disease and give it out to others at great distances of time. But free exposure to the air greatly diminishes or altogether destroys this infecting property; for the contagion of small-pox is of a very volatile nature. The medical attendant, therefore, who goes into the open air after visiting a small-pox patient, seldom if ever communicates the disease. Experiments were made in 1832 for the purpose of determining the power which chlorine possesses to destroy the contagion of small-pox, and likewise the effects of a very high temperature in disinfecting bedding and clothes, but the results were unsatisfactory.

The peculiar miasm or morbid germ of small-pox is given off both by the skin and the lungs. It possesses a peculiar odour. It may be received into the human body in three ways. 1. It may be diffused through the air, and enter the system through the medium of the lungs. This is called the mode

of *infection.* 2. The matter of the pustules, or a scab, may be applied to the unbroken surface of the skin or to the mucous membrane of the nose, and be thus absorbed. This is strictly called the mode of *contagion;* but it must be admitted that the terms contagion and infection are often used indiscriminately to express the silent or, as we say, *casual* reception of the germ. Lastly, small-pox may be taken by applying the fluid matter to a wound of the cutis, and thus causing its certain absorption. This is called the mode of *inoculation*, of which we shall treat at large hereafter.

2. *The epidemic origin of Small-pox.* The facts which *primâ facie* suggest the notion of an atmospheric origin, and which, at any rate, serve to associate small-pox with the large tribe of epidemic disorders, are the following: —

Small-pox, at particular times, spreads with extraordinary facility over a certain district of country. Its ravages, in these epidemic visitations, increase for a certain length of time, attain their crisis or height, and then gradually recede. Attempts have been made to fix the periods of epidemic visitation, and while some have stated seven, others have named fourteen years as the most common interval. The greatest epidemic years experienced by the present generation in England, have been 1781, 1796, 1825, and 1838. The intervals here have been fifteen, twenty-nine, and thirteen years, but on various intermediate occasions small-pox has prevailed, though with less intensity. On the last occasion, the epidemic began in London in November, 1837, reached its height in June, 1838, and finally ceased in January, 1839. A course nearly similar was observed in each of the three preceding years of extensively epidemic small-pox. It has been attempted to connect the occurrence of small-pox on such occasions with some unusual condition of the atmosphere, but in vain. Nothing peculiar has been observed, either with regard to the heat or dryness of the seasons, or the state of the winds, in those years. Neither the thermometer nor barometer help to explain the phenomenon. Small-pox sometimes spreads in a fine clear atmosphere, sometimes in a cold and moist state of the air. The frosts of winter and the heat of summer are alike congenial to it. It is not an unreasonable supposition, that the phenomenon may depend on some peculiarity in the *electrical* condition of the air, which science may hereafter detect. It is known that, in epidemic years, not only is small-pox more general, but it is of a more aggravated character, and consequently more fatal. There are grounds for supposing that at such times the *sphere* of contagious influence is much widened. Dr. Haygarth, who took great pains to investigate this matter, believed that the distance to which the contagious effluvium extends beyond the person of the individual affected, was in all cases alike, and always very limited, not exceeding a few feet. There is reason to suspect, however, some fallacy in these observations. It is very difficult, undoubtedly, to determine with accuracy the distance at which the poison ceases to be energetic, but it is almost certain that the constitution of the air, in epidemic years, permits a very wide diffusion of the variolous germ. It is supposed by some that this diffusibility is the very essence of that principle which we designate as the epidemic constitution of the atmosphere. But this cannot be all; for it is often noticed that persons (vaccinated persons, for instance) who resist small-pox in common years, though fully exposed to the contagion, are attacked by it in years of epidemic prevalence. These and other facts, which bear on the epidemic origin and diffusion of small-pox, were overlooked by those sanguine pathologists, who imagined that in vaccination Nature had provided us with means adequate for the complete extermination of small-pox from the earth.

Susceptibility of Small-pox. All mankind, with few exceptions, are born with a susceptibility of small-pox. This susceptibility unless altered by vaccination, remains, for the most part, equally strong at all ages; though sometimes, from accidental causes, a particular individual shall take it at one period of life, and resist it at another. Persons have been known to go through a long life, exposed frequently to the contagion of small-pox, and yet never take it casually.

The same persons have received the disease by inoculation at an advanced age. A lady was successfully inoculated for small-pox at Salisbury, in 1804, when eighty-three years of age. She had brought up a large family. A few persons pass through life apparently insensible to the variolous virus, whether exposed to it casually or by the mode of inoculation. These cases, however, are exceedingly rare. The power that vaccination possesses to lessen this susceptibility, and to protract the period of receptivity, or, in the opinion of some, to destroy the susceptibility of small-pox in the human frame altogether during the whole subsequent term of life, is a subject which will be discussed in a future page. An immunity from small-pox is said to be a peculiarity in some families, but there is little foundation for such a notion. The circumstances which (independent of vaccination) render a person, either through life, or at particular periods of life, unsusceptible of small-pox, are not well known. Something may depend on the state of the recipient, something on the quality or intensity of the effluvium.

Recurrent Small-pox. In the greater part of mankind, one attack of small-pox gives immunity from future attacks. The virus, indeed, may again have access to the body, but neither fever is excited, nor any kind or degree of constitutional disturbance. Exceptions to this law have undoubtedly occurred. In all ages, from the time of Rhazes, who first described small-pox, its recurrence has been recorded; and of late years, from particular circumstances affecting the alleged power of vaccination, these cases have been brought prominently forward. It will be necessary, therefore, to inquire somewhat more accurately into the phenomena of recurrent small-pox.

The rarity of such cases may be inferred from the fact, that no instances are recorded of persons being received *twice* into the Small-pox Hospital; and the instances of alleged secondary small-pox, admitted into that institution, have been very few. Some physicians of the last century could with difficulty be persuaded that such cases ever occurred. Heberden estimated them at only 1 in 10,000; other writers, at 1 in 8,000, or 1 in 50,000.

Sir Gilbert Blane (*Select Dissertations*) remarks, " that all the well-authenticated cases of second small-pox have been of persons who in the first instance had it severely." This would seem to connect the recurrence of small-pox with some peculiar proneness in the system to suffer under the variolous virus. Such a constitution is said to show a *variolous diathesis.* Other pathologists, again, have noticed that where second attacks have occurred, the first have been very mild. They have imagined, therefore, that the first attack was not in sufficient intensity to alter the whole mass of blood, or, in other words, absorb and destroy variolous susceptibility. It has been stated, that cases of *inoculated* small-pox are more likely to be followed by second attacks, than where the disease is received *casually;* but Baron Dimsdale, whose experience was great, denied the correctness of this statement.

Some cases have been recorded where the first attack had been in such intensity as to leave undisputed evidence of itself in the form of pits and scars, and it has even been said that, occurring under such circumstances, a second attack has proved fatal. The interval between the two attacks is usually very long, extending to twenty or thirty years. In almost all cases, the two attacks vary in intensity; where the first attack was severe, the second proves of the mild, horny, or verrucous kind. On the other hand, where the first is light and varioloid, the second is comparatively severe. It ought not, however, to be forgotten, in forming an impartial estimate of the frequency of such occurrences, that many sources of error are to be taken into account. The attacks succeed each other at long intervals, and the real nature of the first attack is not always easily ascertained. There are, too, as we have already shown, many diseases which resemble variola (such as lichen, varicella, porrigo, secondary syphilis), and a mistake may be made in truly designating the secondary as well as the primary attack. Without meaning to throw discredit on some of the recorded cases of double small-pox, we may, therefore, be permitted to doubt the correct-

ness of others; and, at all events, it must be conceded that unequivocal cases of recurrent small-pox are rare. They have been, and will continue to be, objects of curiosity to the practical physician. We shall hereafter have occasion to recur to these doctrines, and to show, that the attempts made to explain the occurrence of small-pox after vaccination, upon the same pathological principles as apply to recurrent small-pox, have totally failed.

It happens occasionally that a local effect is produced by the application of variolous matter to the body after it has fully undergone small-pox. Thus nurses who suckle children with small-pox, frequently exhibit small-pox pustules on the breast, and sometimes feverishness supervenes. Surgeons have unguardedly pricked their finger with the point of a lancet armed with variolous matter, and have suffered in consequence; but in these cases the affection is local, and the accompanying fever purely symptomatic.

All the cases which have been recorded of small-pox occurring a third or a fourth time in the same person may be set down as apocryphal.

Treatment. The labour that has been bestowed in delineating the several varieties and modifications of small-pox, and in explaining the circumstances under which it shows itself, has been vain and profitless, if medicine be of no service in ameliorating the condition of the patient, and lessening the rate of mortality. Nevertheless, it must be borne in mind, that the influence of medical treatment is much less manifest in this than in many other acute diseases. Improper treatment may, indeed, aggravate the danger, but it often happens that the most skilful treatment scarcely lessens it. It is a melancholy reflection, that for many hundred years the interference of the physician, often thwarting but seldom aiding the efforts of nature, was calculated to diminish rather than to increase the chance of the patient's recovery. Before entering on the curative treatment of small-pox, therefore, it will be proper to recal to remembrance the peculiar nature of the disorder. It is a fever which *relieves itself* by superficial eruption. That eruption, even when too copious, cannot be diminished or checked in its progress by any efforts of art; when moderate, it requires not the interference of the physician. His efforts should be confined, 1. to moderating the arterial excitement when too abundant; 2. to supporting the vis vitæ where it obviously flags; 3. to the relief of urgent and oppressive symptoms, which may incidentally arise in any of the three stages of invasion, maturation, and decline. *Heroic* remedies are here wholly inapplicable, and the great object of art is simply to place the system under the most favourable circumstances for effecting what the old physicians called the concoction and elimination of the morbid humour. An historical survey of the methods of treatment pursued in small-pox, presents a succession of measures, which it is the boast of modern medicine to have abandoned. The hot regimen, bleeding, opiates, stimulants, blisters, and unguents, have been in various ages of the world brought forward as means of undoubted power in the cure of small-pox. The object of the physician in modern times has less of pomp, but more of true philosophy about it. He is content if he can keep within due bounds the action on the surface; if he can check the congestions and inflammations which occasionally supervene in internal parts; and, lastly, if he can support the system under protracted fever, and the exhaustion consequent on extensive pustulation.

1. *Treatment in the initiatory stage.* When the nature of the approaching disorder is unknown, the treatment must necessarily be adapted to the character of the symptoms present. Where it is suspected to be small-pox, the following rules apply. The antiphlogistic regimen is to be pursued as far as the case admits. The surface is to be kept moderately cool. Where pain of the epigastrium, or of the back, or of the head, is very urgent, blood may be taken from the arm, the amount being regulated by the fulness and force of the pulse. Leeches applied to the temples afford great relief to the headach, where the general character of the circulation forbids general bloodletting. A brisk cathartic, composed of three or four grains of the chloride of mercury

with eight of the compound extract of colocynth may be advantageously given to moderate the tumult of the general system. Saline draughts in a state of effervescence may be taken frequently, and the addition of a pill containing two or three grains of James's powder serves to direct the fluids to the surface. Coldness of the extremities will be met by hot bottles to the feet, the pediluvium, or mustard poultices. A languid circulation requires the aid of stimulants, such as camphor julep with ether, wine, or brandy and water. Great restlessness must be quieted by an opiate conjoined with antimonial wine.

It has often been said that bloodletting, in the fever of invasion, interrupts the process of nature, retards or altogether repels the eruption, and so weakens the system as to prevent the due maturation of the pustules. On the other hand, some writers have maintained that free bloodletting, at this stage of small-pox, is the only measure which can effectually lessen confluence, and prevent the development of pustules on the mucous expansion of the mouth and throat. Both these opinions have been taken up in ignorance of the real value of bloodletting at this stage of small-pox, and of the mode of its operation. Bloodletting has no influence on the quantity of eruption, whether cutaneous or mucous. Again, while it sometimes, when incautiously practised, retards the eruption, it as often hastens and encourages it. The eruptive process is frequently impeded by the violence of the febrile commotion, and the oppressed state of the great internal organs, the brain, the heart, and the lungs. Whenever these organs are gorged, and their functions interrupted by a load of stagnant or inflamed blood, where intense headach, extreme irritability of stomach, oppressed breathing, and a full labouring pulse give evidence of such general or local congestion, the loss of blood proves the safest and the surest diaphoretic. To bleed, however, merely because small-pox is anticipated, with the view of preventing confluence, is uselessly to waste that power which will be required for the repair of extensive injury to the surface. The physician will carefully consider all the circumstances of the case, and, keeping these general principles in view, endeavour to promote eruption and diminish internal congestion, without materially impairing constitutional power.

2. *Treatment in the maturative stage.* While the pustules are in process of maturation, a variety of measures may be pursued, which, without interfering with the salutary and necessary process of pustulation, lessen the patient's suffering, and prevent subsequent difficulties.

When the eruption comes out tardily, with continuance of sickness and vomiting, the pulse being small and thready, mustard poultices or a blister may be applied to the epigastrium, and hot bottles put to the feet. The bowels should be relieved by stimulating injections, and the stomach quieted by small doses of an opiate repeated at short intervals. When the patient complains of great pain in the throat, with difficulty of swallowing, leeches may be put on the throat, and the bleeding encouraged by fomentations of poppy-heads and camomile flowers. When the surface is very tender and painful to the touch, cooling lotions may be applied; and in distressing cases, a few leeches will be found the only effectual means of diminishing the local inflammation on which the symptom depends.

The condition of the internal organs will require constant superintendence and regulation during the whole period of maturation, more especially in all cases possessing, or approaching to the character of, confluence or semi-confluence. When the pulse is sharp, and the skin hot and dry, purgative medicines must be administered daily. They may consist of senna and salts, or the compound powder of jalap, or castor oil, or of calomel and colocynth, or calomel and jalap, according to the urgency of the symptoms, and the peculiar habits of the patient. The action of the kidneys is to be encouraged by frequent doses of the citrate of potash in effervescence, or of the liquor ammoniæ acetatis, or of any similar mild diuretic. When cough and copious expectoration of mucous or muco-purulent matter, with increasing dyspnœa, give evidence that the lungs, or smaller ramifications of the bronchia, are taking on inflammatory action,

blood must be taken from the arm to the extent of fourteen ounces, and full doses of antimonial wine with mucilage added to the saline draught. When headach, a flushed face, redness of the eyes, and strong beating of the carotid and temporal arteries accompany a state of delirium, it will be requisite to draw blood from the arm, to apply leeches to the temples, and purge the bowels freely by calomel and jalap. The mere occurrence of delirium in small-pox is not however, *per se*, an adequate ground for bloodletting. Delirium is often present when the pulse is small, and the conjunctiva shows no increased vascularity. Delirium of this kind will abate as the cutaneous inflammation advances to its crisis. Great care should, however, here be taken to protect the patient from self-injury.

In this, and, indeed, in all cases of small-pox of the least severity, it will be proper, from the very first period at which the disorder becomes manifest, to direct the hair to be cut close, and so maintained throughout the whole course of the disease, and for several weeks afterwards. The head is thus kept cool; delirium is relieved, or prevented; the danger of cellular inflammation of the scalp diminished; the chance of ophthalmia lessened; cleanliness enforced. For such great advantages, the finest head of hair should be sacrificed. Ophthalmia occurring during the maturative stage is to be combated by leeches to the temples, an active purgative of calomel and jalap, and the local treatment recommended under *Variolous Ophthalmia*. In all cases it is desirable that the patient should be kept in a darkened chamber. His room should be large and airy. His diet should consist of milk and bread, arrow-root, oranges, ripe fruits, and roasted apples. His drink may consist of toast and water, milk and water, whey, tamarind-water, apple-tea, and lemonade. Sydenham's favourite beverage at this stage of the disease was small-beer, which may safely be allowed.

When the irritation on the surface is very great, and the nights are restless, an opiate may be given with great advantage at bedtime. It may consist of thirty drops of laudanum, or ten grains of Dover's powder. An aperient draught the following morning should not be omitted.

When small-pox is associated with that train of symptoms which constitutes acute malignancy (or a dissolved and putrescent state of the fluids), the influence of medicine is scarcely to be recognised. Acids are usually administered mixed with the decoction and tincture of bark, with a view tc augment the crasis of coagulating power of the blood. Ether, camphor, port wine, brandy, and other stimulants are to be given in quantities proportioned to the wants of the system. Astringents are of no avail. Much attention has been paid in all ages to the *local* treatment of the pustules. The practice of puncturing the pustules, and draining off their contents, was begun by the Arabians, and has been often recommended since, on the plea that danger was to be apprehended from the absorption of matter. This opinion, however, is founded on a pathological error, and the practice is now abandoned by those who test its efficacy on a large scale.

The French have more recently introduced the plan of cauterising the vesicles in an early state, so as to prevent their subsequent development. In the corymbose form of small-pox, where a cluster of vesicles has formed near the eye, some benefit may be derived from the adoption of this remedy; but it is inapplicable to a case of universally confluent small-pox, and it is unnecessary in the milder varieties of the disorder. Some recent observers state that mercurial plasters, composed either of calomel or of corrosive muriate, have the power, when applied to the skin, of so modifying its condition, as to prevent the maturation of the pustules. Applications composed of calomel, however, possess no such power. Those composed of corrosive sublimate occasion great irritation, and convert a mass of confluent vesicles into one large and painful blister, but it would be unreasonable to expect benefit from such a change. The practice has therefore been silently abandoned.

3. *Treatment of the secondary fever.* The decline of the mild forms of small-

pox requires little else than attention to the state of the bowels, and care lest a too great indulgence of the appetite should engender feverish excitement. A warm bath is advisable before the patient is permitted to mix again with the world.

Where secondary fever sets in with any of those complications formerly described, the means of relief must be adapted to the peculiar circumstances of each case. The rules applicable to the treatment of fever generally apply here, but the following principles may be kept in view.

When the pustulation is profuse over the whole body, the strength of the system is to be supported by nourishing diet, an allowance of ale and porter, and gently cordial medicines. These cases usually end favourably, though the exhaustion may be great, and the convalescence very tedious. On the other hand, when the skin dries up, and fever rages in the mass of blood, the greatest attention is required to prevent local congestions, or to check them when they arise. The patient is to be kept upon a low diet, saline medicines are to be diligently administered during the day, a purgative draught is to be directed every morning, and the first appearance of local disorder is to be met by its appropriate treatment. A very absurd dread of purgative medicines in both the maturative and secondary stages of small-pox has influenced the minds of many practical physicians. It is difficult to imagine how it could have arisen, for the value of purgatives is fully as manifest in small-pox as in any other acute disease.

The period of secondary fever is often accompanied with symptoms of extreme debility. The pulse is scarcely to be felt. The tongue is covered with a dark fur. The skin is cold. The expression of countenance is truly typhoid. Subsultus tendinum, and general tremors, further indicate the great exhaustion of nervous power. The most powerful stimulants are now demanded. Wine must be administered liberally, and the medicine should be composed of ether, the subcarbonate of ammonia, and an aromatic tincture in camphor julep.

Erysipelas succeeding small-pox must be treated simply with reference to the accompanying state of the circulation. Sometimes it is best combated by purgatives and saline diaphoretics; at other times wine and tonics are obviously indicated. Variolous ophthalmia is, of all the various sequelæ of small-pox, the most difficult to manage. The loss of blood which the intensity of the symptoms appears to warrant would speedily be followed by great and perhaps irremediable exhaustion. Leeches, cupping-glasses to the temples, calomel and opium, active aperients, and warm fomentations, afford a better prospect of eventual benefit. In some cases, the eye must be sacrificed to save the patient's life. Variolous pleurisy demands the loss of blood from the arm, the application of warm fomentations to the side, and a steady perseverance in the use of that powerful diaphoretic, which is presented in the combination of calomel, James's powder, and opium.

The management of the pustules in the stage of desiccation and decline has been as much an object of attention as their treatment in an earlier period. When the pustulation is profuse, it is very requisite to apply liberally some simple dry powder to absorb the discharge; hair powder, starch powder, the powder of calamine, and well-dried flour, are alike available for this purpose. Cold cream and mild unguents (such as the ung. cetacei, with a proportion of oxide of bismuth) are useful when there is much cutaneous irritation with a dry surface. The efforts so frequently made in former times to prevent pitting, by means of masks and divers ointments, ended generally in disappointment. The only means which can be relied on for preventing such disfigurement, are those which allay general cutaneous excitement. Purgative medicines and low diet, therefore, are those which best deserve our confidence.

When small-pox has called into activity the scrofulous diathesis, the utmost efforts of the physician will be required, but often with very indifferent success. A course of sarsaparilla is sometimes beneficial. Occasionally, moderate doses of mercury (in the form of blue pill, or of the Hydr. cum Cretâ)

will improve the secretions, and with them the general health. But the remedy of most unquestionable efficacy is change of air; it imparts tone to the languid cutaneous vessels, converts an ecthymatous surface into healthy granulations, improves the appetite, and diminishes the strumous irritability of the retina. The influence of an altered air on the diseased actions of the body is better displayed in the sequelæ of small-pox, than in any other known disorder.

Variolous Inoculation.

The universality, severity, and mortality of small-pox have been such as to stimulate the minds of men to the discovery of means whereby the ravages of this frightful disease might be in some measure controlled. Two measures have been devised for this purpose. The one was invented about the beginning of the eighteenth century, in Turkey: this is Variolous Inoculation. The other was discovered in England towards the close of the same century by Dr. Jenner: this is Vaccination. Both discoveries are wonderful efforts of the human mind, unfolding the secret but beneficent provisions of Nature for the mitigation of her most baneful pestilence.

We shall begin with inoculation; tracing first its origin and subsequent diffusion, then describing the mode of conducting the process, and concluding with some reflections on its value.

1. *History of Inoculation.* It is an extraordinary circumstance, that the ingenious inventor of this mode of mitigating small-pox should be unknown. It has been conjectured that it had its origin in the Turkish provinces bordering on the Black Sea (Circassia and Georgia), and that it was first adopted for the purpose of securing the beauty of female slaves; but this opinion is not borne out by any adequate authority. It is rather believed to have been first practised in the Morea. Still less reliance can be placed on the statements put forth as to the antiquity of this practice in China and Hindostan. All that we know for certain is, that the first accounts of inoculation, came from Constantinople, and there, towards the close of the seventeenth or commencement of the eighteenth century, small-pox inoculation must be considered to have originated.

In the year 1703, rumours of the great success attending this new operation reached the ears of Dr. Emanuel Timoni, a Greek physician, who, after studying and graduating at Oxford, had settled as a physician in Constantinople. Convinced, by considerable experience, of the importance of the discovery, Dr. Timoni, in 1713, communicated the facts to Dr. Woodward, by whom they were in turn communicated to the Royal Society of London in 1714. In 1715, Mr. Kennedy, an English surgeon, who had travelled in Turkey, published an account of the new mode of inoculating small-pox, in his *Essay on External Remedies.* In the same year, Dr. James Pylarini, the Venetian consul at Smyrna, published the accounts which had reached him of this novel practice. A notice of his work appeared in the *Philosophical Transactions* for 1716. These curious and important facts were, however, altgether overlooked by the British physicians of those days, and might have been still longer neglected, but for the talent and energy of a lady, the celebrated Lady Mary Wortley Montagu, wife of the English Ambassador at Constantinople. Her spirited and often quoted letter (*Letters of Lady M. W. Montagu*, vol. ii.), dated April 1. 1817, thus describes the new process: —

"The small-pox, so general and so fatal amongst us, is here entirely harmless by the invention of ingrafting, which is the term they give it. There is a set of old women who make it their business to perform the operation every autumn in the month of September. Every year, thousands undergo this operation; and the French ambassador says pleasantly, that they take the small-pox here by way of diversion, as they take the waters in other countries. There is no example of any one who has died in it; and you may believe I am well satisfied of the safety of this experiment, since I intend to try it on

my dear little son. I am patriot enough to take pains to bring this useful invention into fashion in England."

The introduction of inoculation into England proved, however, a more difficult task than Lady Mary had expected. Nothing short of the spirit and enterprise of such a woman could have succeeded in overcoming the prejudices which prevailed equally in the public and the medical profession at that time. On the return of Lady Mary to London in April, 1721, her daughter was inoculated, the first example of inoculation in England. The experiment was then tried on six condemned criminals in Newgate. (Woodvill's *History of Inoculation.*) These and some other trials being deemed satisfactory, the Princess of Wales consented that her daughters, the Princesses Amelia and Caroline, should be submitted to the process, the former being then eleven, and the latter nine years of age. Their inoculation took place on the 19th of April, 1722. They both passed through the disease in a very favourable manner; but the new practice, commenced under such brilliant auspices, received a severe check immediately afterwards, in the death of the Hon. W. Spencer, son of Lord Sunderland, and in that of the butler of Lord Bathurst, both of whom were inoculated in April, 1722.

In June, 1721, inoculation commenced in America, under the direction of Dr. Boylston of Boston. Between that period and the end of January, 1722, 244 persons were inoculated by him, of whom six died. The subjects, however, were ill chosen, and the operator displayed as much ignorance as rashness. The news of this disaster reached London at the very time when the public mind was agitated by deaths in two of the noble families of England, occasioned by the new practice; and it is not surprising that, under such circumstances, inoculation should have been generally discountenanced. In fact, so little progress did it make, that between 1721 and 1729, the total numbers inoculated were only 897, of whom 845 went through true small-pox, 13 exhibited an imperfect effect, in 39 the operation failed altogether, and 17 died.

In other countries, the new practice found more favour than in England; and when, in 1738, these facts became known, its reputation in this country was gradually restored. It was not, however, till the middle of the century, that the practice of inoculation was at all general. Several circumstances contributed at that period to give a favourable bias to the public mind. In 1746, the Small-pox and Inoculation Hospital was founded, for the avowed purpose of extending to the poor, benefits which had hitherto been exclusively confined to the rich. In 1747, Dr. Mead, then the most popular of the London physicians, published his work *De Variolis et Morbillis*, and devoted a chapter to the recommendation of inoculation. In 1754, the Royal College of Physicians of London sanctioned the practice by an official document; and in 1755, the excellent *Memoir on Inoculation* by M. De la Condamine (first published in Paris in 1754) appeared in an English dress.

A new era in the history of inoculation commences with the introduction and general adoption of the Suttonian practice in 1763. Robert and Daniel Sutton were sons of Mr. Robert Sutton, surgeon, of Debenham in Suffolk, who had acquired some fame as a successful inoculator. Both sons followed their father's profession. The one established himself at Bury St. Edmunds, the other at Ingatestone in Essex. Both were in repute, but the success of Daniel at Ingatestone was surprising. It was a success fairly earned by the boldness and dexterity ot his management. The following appear to have been the chief merits of the Suttonian system of inoculation. 1. The tedious preparatory process advised by his predecessors was curtailed from a month to a week. 2. He prepared the system by a course of antimonial and mercurial purgatives. 3. He inoculated by a single puncture, instead of the numerous incisions and clumsy modes of introducing the virus which had been in use before his day. 4. He had great tact in the selection of good lymph for inoculation. 5. He exposed his patients freely to the coldest air, both prior to, and during the progress of, the inoculation. 6. He inculcated the necessity of a spare diet and

cooling drinks. The merit of the Suttons was disparaged because there was nothing new in all this. The Turkish children, it was said, were allowed to continue at play. Sydenham had taught the value of the cooling regimen. The Americans had employed a mercurial purgative. This, however, does not take off from the merit of Daniel Sutton, whose clear and comprehensive mind selected what was good, and rejected the faulty parts of his predecessors' practice.

Baron Dimsdale succeeded to the popularity and extensive practice of the Suttons. In 1766, he published the first edition of his valuable work (*The present Method of Inoculating for the Small-pox*), containing all the essential parts of the Suttonian plan, avowedly taken from the practice of Daniel Sutton, together with the results of his own experience. This work passed through six editions, and became the standard book on inoculation. No further improvements took place. The confidence of the public in the safety and efficiency of inoculation augmented annually; and in the year 1798, all the upper ranks of society in this country, and a considerable proportion of the lower, received the small-pox in this way. In June, 1798, Dr. Jenner announced the discovery of vaccination. In two years afterwards, the general practice of inoculation declined. In 1808, it had almost gone out of use, and has never since been revived.

2. *Practice of Inoculation.* Inoculation is performed by introducing into the arm, near the insertion of the deltoid muscle, by means of a lancet, a minute portion of thin or crude variolous lymph. Well-digested *purulent* matter may also be employed. One incision is sufficient. On the second day, the wound, under the microscope, presents the appearance of a minute orange-coloured spot. On the third or fourth day, the patient experiences the sensation of pricking in the part; the punctured point is hard, and a minute vesicle with central depression may be observed, surmounting an inflamed base. On the fifth day, the vesicle is well developed. On the sixth day, the patient feels stiffness in the axilla, with pain. The inoculated part has become a hard and inflamed phlegmon. The subjacent cellular membrane is involved in the inflammatory action. On the evening of the seventh, or early in the eighth day, rigors, headach, vomiting, offensive breath, alternate heats and chills, languor, lassitude, and perhaps in a child an epileptic paroxysm, announce the setting in of fever. The constitution has taken alarm, and sympathises with the progress of the local disorder.

After the appearance of febrile symptoms, the inflammation of the arm spreads rapidly. An areola of irregular shape develops itself, in which minute confluent vesicles may be traced. The areola continues to advance till the tenth or eleventh day, when the arm is hard, tense, shining, and very red. The pustule discharges copiously. On the eighth or ninth day, spots of variolous eruption show themselves in various, and often in the most distant, parts of the body. The eruption is generally distinct and moderate in quantity. The papulæ can generally be counted without difficulty. 100 or 200 are considered a very full crop. Occasionally not more than two or three papulæ can be discovered, which sometimes shrivel and dry up without going through the regular process of maturation. At other times, the eruption is full, and semiconfluent, passing through all the stages of maturation, pustulation, and cicatrisation, as perfect as in the casual disease. Between these extremes, every possible variety may be observed. The truly confluent eruption with cellular complication is, however, rare. Still rarer is the affection of the mucous membranes; and that implication of the fluids, which constitutes a malignant small-pox, is scarcely ever observed to succeed inoculation. Secondary fever, therefore, and its consequences, are very seldom met with.

It often happens, that on the eighth or ninth day prior to the eruption of the genuine variolous papulæ, the body is overspread with a rose-coloured efflorescence (*Roseola exanthematica* of authors). In a day or two, distinct papulæ may be detected amidst the general redness. The rash then declines,

and the papulæ pursue their regular course. This variolous roseola is said to occur in about one case in fifteen of inoculated small-pox. It is the indication of a mild and favourably disposed eruption. It often precedes, in like manner, the mitigated form of small-pox, as it occurs casually, with or without preceding vaccination.

The following rules and cautions for the safe performance of inoculation have been laid down by the best authors, especially Baron Dimsdale, and they come recommended to us, as well by their own reasonableness, as by the results of long and successful experience. 1. Inoculation should be performed exclusively in persons free from actual bodily disease, not plethoric, and, so far as possible, in persons of sound constitution, without tendency to scrofula. 2. Inoculation may be safely practised at all ages, but some discrimination is of course necessary to insure a successful result. Infants may be safely inoculated about the fourth month, before the process of dentition has actively commenced. Children are also in a fit state for inoculation from the second or third year of life to the period of puberty. Adults, whose blood is not inflamed by spirituous liquors or excessive exercise, may be safely inoculated. 3. It is improper to inoculate during the period of pregnancy, partly from the condition of the maternal blood, but chiefly from the danger of affecting the child. 4. Inoculation may be practised at all seasons, and in all climates. Baron Dimsdale noticed a greater abundance of pustules in spring, than at any other season of the year. It proved not less successful in the West Indies than in Russia. 5. Whatever tends directly or indirectly to diminish plethora, to moderate arterial excitement, to lessen determination of blood to the skin, to clear the bowels of offensive sordes, to regulate the secretions generally throughout the body, and to preserve the blood in a cool and healthy condition, is useful in the conduct of inoculation. Perfect health being the best condition for receiving and safely eliminating small-pox, whatever tends to improve the health, increases the chances of eventual safety. Hence arises the necessity of preparing the body, in certain cases, by a mild diet, cathartic or gently laxative medicines, abstinence from all violent exercise, and all indulgence in heating or spirituous liquors. Hence, too, we may deduce the importance of cool chambers, light clothing, and sometimes free exposure to the external air, in the management of inoculated small-pox. 6. The exhibition of antimonial and mercurial medicines, not for the purpose of regulating secretions, but with a view to produce a state of body especially favourable to the reception of small-pox, is a useless and idle ceremony. The Suttons made this part of their plan; but Sir George Baker, Dr. George Fordyce, and latterly Baron Dimsdale, saw the absurdity and quackish nature of the scheme, and denounced it as frivolous and vexatious. Preparation to persons in sound health is unnecessary, for a man cannot be better than well; but while we disregard unmeaning ceremonies, let it not be forgotten that much caution is requisite when we form a judgment of the state of the blood and secretions (or humours) in any person, particularly in an adult. 7. Some differences of opinion exist as to the degree of importance to be attached to the selection of the lymph with which the inoculation is to be performed. Common sense would dictate the propriety of such precaution, and would suggest, as the fittest matter, such as is taken from a person of sound constitution, where the disorder is running its regular course, and is of the mild or benignant kind. That these precautions have often been neglected with impunity, that severe cases have followed the use of carefully selected lymph, and *vice versâ*, that mild cases have resulted from the insertion of matter from confluent pustules, is undoubted, and therefore too much stress should not be laid on the selection of matter, but it is unreasonable to disregard it altogether. The Suttons preferred the crude or early lymph taken from a primary inoculated vesicle. It is agreed on all hands, that the *lymphatic* or crude matter of the fifth and sixth days is superior in efficacy and certainty of effect to the purulent or well-concocted matter of the eighth and ninth days.

Lastly, the *treatment* in inoculated small-pox must be guided by the same principles which have been laid down as applicable to the casual disease. A few doses of mild laxative medicine will be useful. The propriety of continuing a mild and unirritating diet is obvious. No local application should be made to the puncture, unless inflammation should run high. In that case, cooling lotions to the arm, and a purgative powder containing calomel and jalap, should be employed.

Value of Inoculation. Since the discovery of vaccination, it has been the fashion to cry down inoculation, and to exaggerate its defects. An impartial estimate of the value of inoculation may not, therefore, be well received, but it ought not to be omitted. It was one of the early objections to inoculation, that no reasonable argument could be afforded why the inoculated should prove so much milder than the casual small-pox, why so much difference of effect should result from the morbid germ being received into the system through the medium of the cutaneous absorbents. The circumstance is truly inexplicable, but it must not blind us to the facts. Much labour was bestowed by the statistical writers of the last century in attempts to determine the average mortality of inoculated small-pox. The professed inoculators, perhaps, concealed or explained away some cases. The prejudices of others exaggerated the number of unsuccessful results. It must never be forgotton that persons may be inoculated, after imbibing the germ of the disease casually, and thus death may be unfairly attributed to inoculation. Persons, too, may die of other diseases contracted during the process of inoculation. Making due allowances for these sources of error, it may be stated, that where due attention is paid to the selection of subjects, and the careful management of the disorder, not more than one out of five hundred cases will terminate unfavourably. There can be no question but that the ill success which attended the early inoculations in England, arose entirely from bad management, from careless selection, ignorance of the principles by which the practice should be regulated, and the most absurd modes of surgical treatment. The improvement in the rate of mortality, so remarkable when the practice fell into the hands of judicious men like Sutton and Dimsdale, is decisive of this question, and gives some idea of what the practice might have been brought to, had it continued to the present day, profiting by the increased attention now given to matters of detail, and the generally improved pathology of modern times.

It has of late years been much urged as an objection to inoculation, that small-pox was often taken casually after it, but this impression never prevailed during the period when inoculation was general. It may safely be said, that inoculation gave as complete and certain exemption from a second attack, as the casual disease itself. The two great objections to variolous inoculation are, 1. That it proves the exciting cause of other disorders, and more especially that it calls into activity the scrofulous taint. This is an evil inherent in the very nature of the process; but inasmuch as the inoculated is milder than the casual disease, by so much is the danger lessened, when that process is adopted.

2. The second great objection against the practice of inoculation, insisted on by almost all writers since the discovery of vaccination, is, that it perpetuates the foci of contagion, multiplies the sphere of their operation, and thus, in protecting the life of one individual, exposes to imminent risk the lives of others, who, personally less careful, are not the less deserving of the public care and attention. The argument is very specious, and certainly important; but it should not be received without some inquiry. Such an objection to inoculation was brought prominently forward on various occasions during the last century, and especially in 1777. Dr. Watkinson, Dr. Schwenke, and others, in that year, attempted to diminish its force, by pointing out how important a part epidemic influence played in the diffusion of variola. They argued, that where such epidemic influence existed, the spread of small-pox would be equally great, whether inoculation were practised or not. On the other hand, when no such condition of the atmosphere prevailed, inoculation would be in this respect

harmless. They may have overrated the value of this argument, but it must not be overlooked. The strongest proof of its force is, that in 1838, when inoculation was unknown in London, the admissions into the Small-pox Hospital exceeded those of 1781, when inoculation was universally practised; both being years of epidemic prevalence. Had inoculation been practised in London in 1838, its wider diffusion then would undoubtedly have been attributed to that source. Sir Gilbert Blane (*Med. Chir. Trans.*, vol. x.) has laboured diligently to prove this charge against inoculation by reference to the bills of mortality. He makes it appear that the proportion which the mortality by small-pox bore to the total mortality, increased during the last century from 78 in 1000 to 94 in 1000. From this he concludes, that "inoculation, by opening a new source for the diffusion of its virus, has actually been found to add to the general mortality of small-pox." A statement of this kind seems at first sight incontrovertible, but all arguments deduced from statistical researches must be received with limitations; and many circumstances concur to show the necessity of this in the present instance. In the first place, as Sir G. Blane himself candidly acknowledges, the general mortality has diminished: consequently, if the mortality by small-pox had remained stationary, the same result would have occurred. But, further, the population has vastly increased, and this must influence the result. Dr. Adams (*Inquiry into the Laws of different Epidemic Diseases*) has shown that a corresponding increase has taken place in other diseases not communicable by contagion. He further makes it evident, that, by a different mode of calculation, a diminution in the deaths by small-pox, since the more general adoption of inoculation, rather than an increase, may be made to appear. Thus, in the thirty years that elapsed between 1741 and 1770, there died of small-pox, within the bills of mortality, 63,308 persons; whereas, in the next thirty years (viz. from 1771 to 1800 inclusive), when inoculation was general throughout London, there died only 57,268.

These considerations must convince any unprejudiced mind, that the argument against inoculation, drawn from its supposed tendency to augment and multiply the foci of contagion, is not so forcible as the opponents of inoculation invariably allege.

On a general review of all the facts bearing on variolous inoculation, we cannot refuse to acknowledge, that it was a most valuable discovery, and the process itself a merciful provision of Nature against the ravages of a frightful pestilence. Had not the discovery of Jenner occurred to interrupt the extension of the practice, it would probably have continued to this day, increasing yearly in popularity. Whether it be ever destined again to occupy the thoughts of men, and to cooperate with vaccination in the general design of mitigating the severity of small-pox, is a question which, at the present time, it would be certainly premature, and perhaps unnecessary, to consider.

Vaccination.

The second measure which has been devised for controlling the severity and limiting the ravages of small-pox is vaccination. The circumstances that paved the way to this great discovery are fully known to us from various sources, of which we must content ourselves with offering a brief outline.

1. *History.* It is to the indefatigable zeal of Dr. Jenner, that the world is indebted for the discovery of vaccination. He appears very early in life to have had his attention fixed by a popular notion among the peasantry of Gloucestershire, of the existence of an affection in the cow, supposed to afford security against the small-pox; but he was not successful in convincing his professional brethren of the importance of the idea; and so distasteful did the subject of cow-pox become to them, that he was at length compelled to abandon all attempts to interest others in the inquiry. His own ardour, however, was undiminished, and for nearly twenty years he continued without interruption to follow his favourite pursuit.

In the progress of his investigations, Jenner was impressed with the practicability of propagating the cow-pox by inoculation, from the cow first, and subsequently from one human being to another, so as to perpetuate the disorder. This magnificent idea appears to have first occurred to him about the year 1780. It was long after this date, that Jenner first attempted, by actual experiment, to prove the truth of his speculations. So slowly did the philosophical mind of Jenner ripen into conviction, that he inoculated his own son with small-pox in November, 1789. It must be acknowledged, however, that opportunities of experiment were not easily found; the cow-pox was often absent from the dairy-farms for many years in succession. At length, however, the favourable opportunity occurred; cow-pox in an active state was found, and on the 14th of May, 1796 (commonly regarded as the birthday of vaccination), a child eight years of age was vaccinated by Dr. Jenner, with matter taken from the hands of a milker. He passed through the disorder in a manner perfectly satisfactory, and, on the 1st of July following, was submitted to variolous inoculation by way of test, but it took no effect.

Dr. Jenner still delayed publishing the result of his researches, that he might, if possible, strengthen his case by additional experiments. This he did in the spring of 1798; and in June, 1798, put forth his original essay (*Enquiry into the Causes and Effects of the Variolæ Vaccinæ*).

In this work, Jenner treats first of the causes of small-pox. He traces the disorder in the cow to contamination from the horse, where it appears in the foot, and is known to farriers by the name of *the grease*. The hands of the milkers and farm servants are stated to be the medium of communication. He intimates, that small-pox itself may be a poison of the same nature, aggravated by accidental circumstances into a malignant and contagious disease; and he announces his conviction that cow-pox, when it has once passed in a perfect form through the human body, leaves the constitution for ever after secure from the infection of small-pox. Sixteen cases of the casual or natural cow-pox, and seven of the inoculated disease, are detailed. In this Essay, Jenner nowhere hints at the possibility of his plan ultimately exterminating the small-pox, nor does he propose the abandonment of inoculation, but he modestly suggests the probability of its usefulness in persons who, from family predisposition or otherwise, may be presumed liable to take small-pox severely.

It is difficult to imagine a work better calculated from its tone, and object, and cautious recommendations, to attract and fix the public attention. A strong and irresistible impression in favour of cow-pox became general, and vaccination at once popular; and medical men (with few exceptions) became everywhere its strenuous advocates and supporters.

Stimulated by success, Dr. Jenner soon after threw off the reserve manifested in his first publication, and loudly announced that cow-pox possessed powers adequate to the extirpation of small-pox from the earth. In May, 1801, within three years after the first announcement of the discovery, he writes thus: "It is now too manifest to admit of controversy, that the annihilation of small-pox, the most dreadful scourge of the human species, must be the final result of this practice." The brilliant prospect thus held out, added immeasurably at the time, and for many years afterwards, to the splendour of Jenner's fame; but it has been the occasion of all the anxieties and disappointments since experienced; and it would perhaps have been better, if the cause of vaccination had been trusted to the more cautious statements put forth in Jenner's original Essay.

The advances made by vaccination were rapid almost beyond belief In 1801, Dr. Jenner states that 6000 persons had been vaccinated, the greater number of whom had been tested with small-pox, and subsequently exposed to infection, without effect. In 1799, the practice of vaccination commenced in America; and in the same year, the most eminent physicians and surgeons of London signed a strong testimonial of their confidence in the virtues of cow-pox. In 1800, vaccination was introduced into France, and spread rapidly

over the whole Continent. In 1802, it commenced in Hindostan, and was thence propagated over every part of the continent of Asia. The parliament of England voted to Dr. Jenner 30,000*l.* as a reward for his discovery, and his generous devotion to the public welfare. Dr. Jenner died in 1823, at Berkley, the scene of his early labours, full of years and honours. During the latter years of his life, he devoted much of his time to the subject of vaccination, but be never wrote much concerning it subsequently to 1803.

It is now necessary to advert to some of the circumstances which clouded the brilliant prospect with which vaccination began. In 1809, Mr. Brown of Musselburgh published his opinion that the prophylactic virtue of cow-pox diminished as the distance from the period of vaccination increased, but his statements made no impression on the public mind. In 1818 and 1819, an epidemic small-pox pervaded Scotland, and many persons passed through a mild form of the disease. The term *modified small-pox* was now introduced, and generally adopted. Dr. Monro, in 1818, published a volume on the subject (*Observations on the different Kinds of Small-pox, and especially on that which sometimes follows Vaccination*), which attracted great attention. The more elaborate work of Dr. Thomson of Edinburgh (*An Account of the Varioloid Epidemic*), which appeared in 1820, occasioned much discussion among medical men, but their confidence in vaccination was in no degree shaken. In 1824, small-pox prevailed epidemically in Sweden, and attacked a considerable number of vaccinated persons. In 1825, an epidemic assailed London, where the bills of mortality announced 1300 deaths by small-pox, among whom were several persons who believed that they had been vaccinated. Similar epidemics subsequently pervaded France (1826 and 1827) and the northern parts of Italy (1829). In the same year, the government of Germany, who had always encouraged and even enforced vaccination, took alarm; and then began the practice of revaccination, which has formed so striking a feature in the medical history of those countries for the last ten years. Within the last two years, the same practice has been adopted voluntarily by vast numbers of persons both in France and England.

In 1833-4 small-pox prevailed epidemically at Ceylon (*Report on Small-pox, as it appeared in Ceylon in* 1833-4), when a considerable number of the vaccinated died; and on several occasions, both prior and subsequent to this date, it made great devastations in Hindostan, and the vaccinated have not been exempt from the calamity.

In 1838, small-pox again raged epidemically in London; the admissions into the Small-pox Hospital in that year more than doubled the average number received annually prior to the discovery of vaccination. Two fifths of the admissions consisted of persons who had been vaccinated. Many had the disease severely, and more than twenty of the number died. In the same year, also, small-pox prevailed extensively in the British army.

These historical details cannot be read without the conviction that all idea of banishing small-pox from the earth is vain and illusory.

2. *Phenomena of Vaccination.* The regular course of cow-pox is as follows. On the third day from the insertion of the virus, the wound appears red and elevated. By aid of the microscope, the efflorescence surrounding the inflamed point will be distinctly perceived even on the second day. On the fifth day, the cuticle is elevated into a pearl-coloured vesicle, containing a thin and perfectly transparent fluid in minute quantity. The shape of the vesicle is circular or oval, according to the mode of making the incision. On the eighth day, the vesicle is in its greatest perfection, its margin turgid, and sensibly elevated above the surrounding skin. In colour, the vesicle may be yellowish or pearly. The quantity of fluid which it contains, varies much. When closely examined, the vesicle exhibits a cellular structure. The cells are from ten to fourteen in number, by the floor of which the specific matter of the disease is secreted. The vesicle possesses the umbilicated form belonging to variola.

On the evening of the eighth day (after the incision), an inflammatory circle,

or areola, commences at the base of the vesicle. The skin becomes tense, red, and painful for a considerable extent around. The figure of the areola is perfectly circular. In some cases, the subjacent cellular membrane participates in the inflammatory action, and occasionally the glands of the neck swell. The areola continues to advance during the ninth and tenth days. On the eleventh, it begins to fade, leaving, in its decline, two or three concentric circles of a bluish tinge. The vesicle has by this time either burst, or been opened by the lancet, and a scab forms of a circular shape, and of a brown or mahogany colour. By degrees this hardens and blackens; and at length, between the eighteenth and twenty-first day, drops off, leaving behind it a cicatrix of a form and size proportioned to the prior inflammation. A perfect vaccine scar should be of small size, circular, and marked with radiations and indentations.

Until the eighth day, the constitution seldom sympathises. At that time, however, slight febrile excitement generally comes on. There is, however, much variety observable here. Sometimes scarcely any constitutional disturbance is perceptible. It is not uncommon to find the child's body covered generally or partially with a papular eruption of a lichenous character, from the ninth to the twelfth day, or even later. It is seldom seen in adult vaccination; but is frequent in children of full habits, in whom numerous vesicles had been raised, which discharge freely. The irregularities and anomalies of cow-pox are various. That most commonly observed, is when the vesicle, at a very early period, becomes prematurely red and itching; a small acuminated, conoidal pustule is perceived on the eighth day, surrounded by a slight areola of irregular shape. The contained fluid, instead of being a clear and transparent lymph, is opaque, and of a light straw colour. The succeeding scab is small, and drops off prematurely.

In another variety, the specific inflammation proves very violent. It extends from shoulder to elbow, and sometimes runs into genuine erysipelas. The vesicle, instead of drying into a hard scab, is converted into an ulcer, discharging profusely, and leaving behind it a large scar of the size of a common wafer, in which neither rays nor depression can be traced. The question, how far such severe local irritation interferes with the constitutional result of cow-pox, has never been satisfactorily determined.

A third variety exhibits, about the sixth or seventh day, the vesicle partially inflamed, and scaly. A species of psoriasis takes the place of areola. No confidence can be placed in so defective a process as this.

Cow-pox is occasionally retarded in its progress without any obvious cause. We have never known the period of retardation to exceed sixteen days.

The proper time at which lymph may be taken, so as to obtain it in the most efficient state for propagating the disease, has been a subject of much discussion. The facts bearing on this question are, we believe, as follows. The younger the lymph is, the greater is its intensity. The lymph of a fifth-day vesicle, when it can be obtained, never fails. It is, however, extremely powerful up to the eighth day, at which time it is also most abundant. After the formation of the areola, the true specific matter of cow-pox becomes mixed with variable proportions of serum, the result of common inflammation, and this diluted lymph is always less efficacious than the concentrated virus. After the tenth day, the lymph becomes mucilaginous and scarcely fluid, in which state it is not at all to be depended on. Out of a dozen incisions made with such viscid lymph, not more than one will prove effective.

Infantile lymph is more to be depended upon, than that obtained from adults. The matter of primary is more energetic than that of secondary vaccinations. These statements may serve as a guide to the surgeon in the important matter of selecting lymph with which the operation is to be performed.

Another matter worthy of consideration is the mode of making the incisions, so as to insure the best and most certain results. We know that, provided the lymph be good, it matters little in what way the virus be applied, but we have reason to believe that the following is the most uniformly successful

mode. Let the lancet be exceedingly sharp. It should penetrate the corion to a considerable depth. In making the incision, the skin should be held perfectly tense between the forefinger and thumb of the left hand. The lancet should be held in a slanting position, and the incision made from above downwards. We would recommend, that with lymph of ordinary intensity three or four vesicles should be raised, and that these should be at such distances from each other as not to become confluent in their advance to maturation.

Vaccine lymph should always be used in a fluid state, and direct from the arm, whenever practicable; for it is a very delicate secretion, and the smallest fermentative process in it is liable to alter its qualities, and to occasion that irritable sore, which we have named as the most frequent of the anomalous appearances.

3. *Theory of vaccination.* It would lead us into too wide a field to follow out the views which have at different times been taken regarding the modus operandi of vaccination. Jenner originally proposed and steadily adhered to the notion, that cow-pock and small-pox were identical in their nature, and that vaccination is only a milder form of inoculated small-pox. This opinion has received a very remarkable corroboration in the recent experiments of Mr. Ceely of Aylesbury, which have proved that the cow may be inoculated with variolous matter, and that in passing through the body of the animal, the matter is converted from small-pox into vaccine. But though it be admitted that cow-pox and small-pox have a common origin, it by no means follows that they are identical diseases acknowledging the same laws. The immediate effects of the two poisons undoubtedly differ. The local inflammation is different, and the constitutional influence is different. It would be unfair therefore to argue regarding their ulterior effects without reference to the results of experience. Now it is impossible to call in question the fact that vaccinated persons are more liable to attacks of small-pox than those who have once undergone that disease. The one is now very common. The other was always considered as a rare event.

Among the circumstances that materially influence the protecting power of cow-pox is time. In the early periods of vaccination (1800 to 1805), the practice of inoculating after cow-pox, so as to test its prophylactic power, was carried to a great extent, and many thousands were exposed to the variolous effluvium with impunity. Since the year 1808, these experimental testings have almost entirely ceased, and we consequently know very little concerning the effect of inoculation at long intervals from the date of vaccination. But it is a matter of general notoriety, that small-pox taken casually after vaccination is very rare under the age of eight years. The protective power may be considered as nearly complete for that period. About the ninth or tenth year of life, small-pox after vaccination begins to be met with. It increases in frequency at the period of puberty, and is still more common between the ages of 18 and 25. With these facts before us, it is impossible to conceal the apparent conclusion that time lessens the power of resistance to the variolous germ.

The influence exerted by an atmospheric constitution over the power of variolous resistance, opens a wide but hitherto neglected field of inquiry. Having now witnessed in London two severe epidemic visitations of small-pox, we have no hesitation in stating, that such influence is undoubted. The fact does not, from its very nature, admit of direct proof, but the number of persons attacked during epidemic seasons, who had successfully resisted small-pox contagion *communibus annis*, offers an argument in favour of the position, which to our minds is irresistible.

We come now to apply these views of vaccine pathology to the examination of the two practical measures suggested of late years to remedy the acknowledged defects of vaccine influence. The first of these is recurrence to the cow for supplies of primary lymph. The second is revaccination at distant intervals from the date of the primary process.

1. *Recurrence to the cow for primary lymph.* The impression that vaccine virus decays in power in proportion to the number of times that it makes the circuit of the human body, has long prevailed, and is steadily gaining ground. In all parts of the Continent, and in England, it has led to the frequent trials of lymph recently obtained from the cow.

Persons vaccinated by Dr. Jenner himself, in the very infancy of the practice, before such deterioration could possibly have taken place, have undergone small-pox in after life. Such occurrences are now more common than formerly, but much may be attributed to the extension of the practice of vaccination. The Royal Jennerian Institution of London employs, now the same lymph which has been in use since the year 1806, when the Institution was founded. According to this authority, lymph recently obtained from the cow does not generate a vesicle in any way superior to that produced by the old lymph. (*Report of the Royal Jennerian Institution*, 1836.) The same result was obtained in Italy in 1829, when the alarm of epidemic small-pox induced the Piedmontese physicians to try a variety of new stocks of lymph. We are informed by Dr. Griva (*Epidemia Vainolosa del Torino*, 1829), chief of the Vaccine Establishment at Turin, "that no perceptible difference was to be traced between the aspect and progress of the old and the new, the primitive and the long humanised, virus." In Germany, the plan of recurrence to the cow has been largely tried of late years. In Wirtemberg alone, between 1831 and 1836, forty varieties of primitive lymph were successfully employed. The notion of superior efficacy attaching to the new lymph was, however, not generally entertained. (Heim, *Historische Kritische Darstellung der Pockenseuchen.*) On the other hand, we are bound to acknowledge that the Small-pox Hospital of London changed their old stock of lymph for more recent matter in 1837, and that a marked improvement was perceived in the resulting vesicles. The local inflammation was more severe, the constitutional symptoms were more violent; the virus was more energetic; the most minute incision took effect, and the lymph given out on the ninth and tenth day was still in an active state. The National Vaccine Establishment has also, on several occasions, varied their stock of lymph with advantage. In France, a new variety of vaccine lymph, obtained from the dairies of Passy, near Paris, and called *Passy* lymph, was brought into use in 1836, and is considered by many as superior to the old stock. In 1838, Mr. Estlin of Bristol opened a new source of lymph from a dairy in that neighbourhood. It has been found very energetic, and is now employed in many parts of England in preference to the lymph of the National Vaccine Establishment.

2. *Revaccination.* By many of the physicians of Germany, this measure is extolled as scarcely less important in its effects nor less widely applicable than vaccination itself. The authorities in Paris on the other hand, have reported to the French government against the necessity of revaccination, and there is really some difficulty in deciding on the actual merits of the plan. The Germans aver that few, if any, of the recently revaccinated have fallen under the influence of small-pox, but the time which has elapsed since the general adoption of the measure detracts from the value of such a statement. The practice may be recommended for its safety, even if it be much less serviceable than the Germans contend for. We have sufficient facts before us to state with confidence that it need never be recommended prior to the tenth year of life, and that the age best fitted for it is from the period of puberty to that of confirmed manhood.

MEASLES.

Definition. — *History.* — *Varieties.* — *Rubeola vulgaris.* — *Rubeola sine catarrho.* — *Rubeola maligna.* — *Sequelæ.* — *Anatomical characters.* — *Diagnosis.* — *Prognosis.* — *Causes.* — *Treatment.*

The terms, *The Measles* (Cullen), *Rubeola* (Willan, Sauvages), *Morbilli* (Sydenham, Morton), are employed in the present day as synonymes to designate a disease, the distinguishing characters of which are, a continued contagious fever, accompanied by a peculiar exanthema or rash, generally combined with inflammation of the mucous membrane of the respiratory organs.

The earliest writers on measles have created no little confusion by describing the small-pox and measles as the same disease, admitting, in their judgment, of some variation in its forms. Rhazes himself, in a tract published in the ninth century (*De Variolis et Morbillis*, A. D. 1486, transl.), considers the measles and small-pox as the same disease, requiring a similar mode of treatment; but he was more careful than any of his countrymen to point out some of their specific differences. However extraordinary it may appear, this error was transmitted by medical authors through eight or nine centuries. The sagacious Sydenham distinguished and described great differences between the two diseases, as may be seen in his account of the *Variolæ regulares*, A. D. 1667-8 and of the *Morbilli*, A. D. 1670. Nevertheless, Sydenham adverts to the analogies which had caused physicians to confound these diseases, and particularly to the decline of the measles on the eighth day, "Quo tempore vulgus (a spatio, quo perdurare solent variolæ) deceptum, eosdem introverti adfirmat; licet reverâ morbilli cursum à naturâ destinatum absolverint." (*Op. Univ.*, sect. iv. cap. 5.)

In the history of scarlatina it has been shown how long that disease was mistaken for a severer form of measles, and that Morton with many subsequent writers, even so recently as the end of last century, contended that they differed only in degree and not in kind. It was not until the appearance of Dr. Withering's *Essay on Scarlet Fever* in 1793, and Dr. Willan's *Treatise on Cutaneous Diseases*, that the Profession at large was convinced of the distinct nature of the two diseases. The observations of these, as well as subsequent writers, have satisfactorily shown that, in the precursory symptoms, in the characters of the rash, in the accompanying lesions of internal organs, and in the sequelæ, there are solid reasons for believing these two diseases to be induced by separate specific poisons. Frank, in his *Observations upon the Exanthemata* (vol. ii. p. 216. French edit.), has remarked that, as "there is no exanthema which does not occasionally exist without its peculiar fever, so, on the other hand, there is not one of the exanthematous fevers which does not, in certain cases, pursue its course without any cutaneous eruption, and with the same consequences as in other cases." The accuracy of this remark is more apparent in the history of scarlatina than of rubeola; nevertheless, the irregularities in the symptoms of the latter disease manifested in different individuals, and in distinct epidemics, are sufficiently striking to warrant us in describing three forms or varieties of rubeola.

We shall first describe the more ordinary form of measles (*Rubeola vulgaris*); secondly, that in which the action of the poison, as in one of the varieties of scarlatina, is limited to the skin (*Rubeola sine catarrho*); and, thirdly, that form in which the intensity of the poison is manifested by the most malignant symptoms (*Rubeola maligna*).

1. *Rubeola vulgaris.* In this form there are symptoms of febrile disturbance, generally for several days before the appearance of the characteristic rash. In the slighter cases the premonitory symptoms are those of catarrh, accompanied with profuse watery discharges from the eyes and nose: in the more

severe cases, on the first and second days, there are irregular shiverings alternating with heat of skin, general lassitude or listlessness, occasional flushing, giddiness, sensation of pain or weight across the forehead, with drowsiness, soreness of the throat and hoarseness, thirst, furred tongue, frequent pulse, and in some cases epigastric tenderness with sickness or vomiting. On the third and fourth days these symptoms become aggravated, the eyes smart, the conjunctiva becomes suffused, the eyelids swollen, and the tarsi red, with copious secretion of watery fluid from the eyes and nostrils, frequent sneezing, harsh dry cough, and oppression of breathing. It is during this accession of symptoms that the efflorescence makes its appearance. In those who have a delicate florid skin, or who are living in a high temperature, the rash sometimes appears partially on the third day; but when the skin is dark or thick, or when the patient is exposed to cold, it may not come out till the fifth or sixth day; in general, however, it appears on the fourth day. It is first visible on the head, around the margin of the hairy scalp, behind the ears and about the temples, then on the forehead, nose, cheeks, and throat, exhibiting elsewhere, in the course of the first day, only a few scattered red specks like fleabites. The rash consists of small irregular red dots, slightly prominent and sensible to the touch, especially on the face, of a less bright tint than that of scarlatina; sometimes however, as in the malignant measles, the colour is dark and livid: to those cases Willan applied the term *Rubeola nigra*. The colour of the skin vanishes on pressure, but rapidly returns when that is removed. The rash in some cases is so abundant, that but little of the skin is left in its natural state: the red spots become confluent, and form patches which frequently assume a semilunar or crescentic shape. These patches are slightly raised, and give to the finger the sensation of an uneven surface. In the severer cases, and especially in infants, the rash is often interspersed with papulæ, and during the height of the efflorescence, vesicles sometimes appear on the neck, breast, and arms. In many cases, at the height of the eruption, there is swelling of the face, and especially of the eyelids, which are sometimes so swollen as to close the eyes for a day or two. The eruption does not at once cover the whole body, but having appeared, on the third or fourth day of the febrile attack, on the head, face, neck, and slightly on the upper extremities, on the fifth day spreads over the trunk and upper extremities, and on the following day becomes visible on the lower extremities. At this period the efflorescence is said to be at its height. On the succeeding three days the rash gradually fades and disappears, first on the face, then on the trunk and upper extremities, and lastly from the lower extremities. When the rash begins to decline on any part, the cuticle becomes dry and rough, and soon after separates in the form of scurf. Hence arises a troublesome itching of the skin, which continues from the seventh to the tenth day. It is to be observed that, with the appearance of the rash on the surface of the body, small dark red patches, more or less confluent and of nearly similar form, may be detected on the palate, uvula, and tonsils. This state of the fauces occasions a sensation of soreness in the throat, but is not followed by any lesion of the part, and disappears as the rash declines from the surface of the body.

The inflammation of the eyes, the discharge of tears, the sneezing and hoarseness, generally cease on the decline of the efflorescence about the seventh day; at least the swelling of the eyelids and watery secretion are much abated at that time. The febrile symptoms do not sensibly diminish on the appearance of the rash, but are often somewhat aggravated: the more distressing symptoms, however, generally abate on the sixth day. About the ninth or tenth day, or even at an earlier period, especially in children, diarrhœa often supervenes, and is troublesome for days afterwards. Between the fourth and sixth days, epistaxis, or, in adult females, uterine hæmorrhage, sometimes appears. In many instances upon the decline of the eruption, the pectoral affection becomes predominant, and often places the patient in danger. This is indicated by the increased frequency of cough, hurried breathing, and aggravation of the fe-

brile symptoms. Upon careful auscultation, the existence of diffused bronchitis, and occasionally the physical signs of circumscribed pneumonia, or pleuritis, may be detected: these affections are often prolonged for several weeks beyond the ordinary duration of the disease. More rarely, the decline of the rash in children is succeeded by acute inflammation of the larynx or trachea.

Such is the usual course of the measles in their more common and regular form, but some peculiarities are occasionally observed, which require to be noticed. Thus the eruption, sometimes anticipating the ordinary time of its appearance, comes out on the second day; in other instances the catarrhal symptoms exist for a fortnight or longer before the appearance of the rash. In some instances the rash appears first on the body instead of the face, and in some rare cases it has been confined to those parts without spreading to the extremities. Again, it has occasionally been observed, that the rash, after having declined, has reappeared with symptoms of fever. Dr. Willan, in his *Reports*, p. 106. has related two remarkable cases of this anomaly; and Dr. Conolly has recorded a nearly similar case, where the eruption came out and seemed to be disappearing at the usual period, when it suddenly broke out again, and to such an excessive degree, as to make it impossible to recognise the features. (*Cyc. Pract. Med.*, art. HYSTERIA.) Frank has also detailed a case of the same irregularity (tom. ii. p. 377.). Some other irregularities in the course of measles have been occasionally noticed. Thus, Dr. Heberden met with a case where salivation appeared to be vicarious of the catarrhal symptoms. Sometimes, also, muscular twitchings, or even convulsions, precede the eruption.

2. *Rubeola sine catarrho.* When the measles are epidemic, a few cases occur in which the eruption goes through its different stages without the usual catarrhal, and with very slight febrile, symptoms. This variety, first observed by Willan, does not protect the constitution from the regular form of measles; and on this account it is rejected by Frank as spurious; and Dr. Williams (*Elements of Med.*) says, that "this reason would certainly be sufficient to induce him to acquiesce in this decision." But this objection cannot be admitted, for, besides the opinion of Willan, Bateman, and other writers, that it is a distinct variety, the recurrence of measles in the same person has been witnessed by Willan, Baillie, and others.

3. *Rubeola maligna.* A more severe form of measles has been noticed to prevail occasionally, to which the term *malignant*, or *putrid*, has been applied. During ordinary epidemics, a few cases of this malignant type may occur; but it has been observed sometimes to constitute the prevailing character of the disease. The eruptive fever and catarrhal symptoms are from the beginning severe, the former soon assuming the typhoid aspect, while, through the whole course of the disease, insidious local inflammations, especially of the lungs, arise, and which either speedily destroy the patient, or protract the course of the disease indefinitely.

At the commencement there is nothing remarkable, except that the fever is violent; there is extreme restlessness, thirst, and heat of skin; the pulse is frequent, but soft and compressible; the respiration hurried; the cough, dyspnœa, sense of tightness, or præcordial oppression, distressing; the eruption comes out irregularly, appearing sometimes earlier than usual, receding, and reappearing. It is seen in irregular patches on different parts of the body, at one time red, at another pale, livid, or interspersed with petechiæ or ecchymosis. The mucous membrane of the tongue and fauces assumes a dusky red or livid colour; there is often sickness or vomiting, with abdominal tenderness and frequent dark offensive stools. The brain partakes early of the constitutional distress; the look is oppressed, and transient delirium passes into coma, or convulsion supervenes. In the majority of cases, inflammation either in the lungs or brain arises, and does not abate with the decline of the eruption, while the fever assumes more and more the typhoid type, the pulse becoming very frequent.

Many patients sink rapidly, asphyxiated by the intense congestion of the pulmonary mucous membrane; in others, subsultus and convulsions supervene, and speedily destroy the patient: not unfrequently, however, life is protracted a considerable time, the powers being gradually exhausted by diarrhœa and discharges from the mucous membranes.

This form of measles is fortunately of rare occurrence, though now and then, as has been stated, isolated cases may occur in an epidemic otherwise mild. Huxham has described an epidemic of malignant measles occurring at Plymouth, A.D. 1745. (*De Morb. Epidem.*, vol. ii.) Sir William Watson, who was physician to the Foundling Hospital, describes epidemics of malignant measles which attacked the children of that institution in the years 1763 and 1768. In the former 183 were attacked, and nineteen died; in the latter 139 had the disease, and six only died. (*Med. Obs.*, vol. iv.) In 1816 a malignant form of measles appeared in Edinburgh, and many children died from pulmonary inflammation, the pulse having been very rapid, and the eruption irregular and of a livid colour. Similar epidemics have been also occasionally observed in other countries. In the autumn of last year (1839), we were called upon to assist the medical officers of Christ's Hospital in controlling epidemic malignant measles, which appeared among the boys at Hertford. The symptoms closely resembled those described by Huxham and Watson: of 127 boys attacked seven died of pulmonary inflammation, which resisted the ordinary treatment.

Sequelæ. Measles are frequently followed by troublesome affections of the mucous membrane of the lungs or intestines. The occasional supervention of inflammation of some of the tissues of the lungs in the course of rubeola vulgaris has already been noticed. Upon the decline of the disease, chronic bronchitis, pertussis, or tubercular disease of the lungs, occasionally supervenes. The cervical and mesenteric absorbent glands frequently enlarge, and occasion great constitutional irritation. Another sequela of measles is a troublesome diarrhœa, which greatly exhausts the patient. Ophthalmia and abscesses in the ear and in the cellular tissue surrounding the parotids also occasionally supervene. Sometimes aphthæ appear on the tongue and lining of the mouth, which quickly degenerate into formidable gangrenous ulceration; and in some rare cases similar ulceration appears about the pudenda. Various forms of cutaneous affections, more especially pustular porrigo and impetigo, are also apt to appear after measles.

Anatomical characters. It is very rarely that death occurs during the eruptive stage of measles, so that the condition of the mucous membrane of the trachea and bronchi at this early period is unknown, though it is probably more or less involved in the eruption. In unfavourable cases the fatal termination generally happens after the decline of the eruption, in consequence of some serious pulmonary lesion or protracted diarrhœa. Dr. Willan found, in some of his fatal cases, "an effusion of lymph mixed with blood, or matter, into the cavity of the thorax." Laennec was of opinion that the suffocating orthopnœa, which sometimes carries off children at the termination of measles, was produced by idiopathic œdema of the lungs. Dr. Williams says, that if the substance of the lungs become inflamed, the quantity of fluid effused into them is frequently so considerable, that it streams as from a sponge as soon as the lung is divided. Dr. Montgomery on the other hand asserts, that in the greater number of cases examined after death by him, the morbid alteration existing was the condensation of the pulmonary structure ordinarily found as the effect of pneumonia. In the fatal cases recorded by M. Rayer, the most frequent morbid lesions discovered were extensive bronchitis, gastro-enteritis, pneumonia, pleuritis, croup, and enlargement of the mesenteric glands. (*Traité des Maladies de la Peau.*)

Diagnosis. The only disease with which the measles are likely to be confounded is scarlatina. For the distinguishing characters between the two, see SCARLATINA.

Prognosis. The prognosis in measles during the early stage of the disease is always favourable ; but a mild attack of the proper symptoms is often suddenly converted into a most dangerous disease. It should be recollected that the eruption, or the mere disease, rarely puts the patient's life in hazard, as we so frequently observe in scarlatina, in which the vital powers are so alarmingly depressed by the action of the poison ; but in measles the internal inflammation, particularly of the lungs, which frequently supervenes, is the chief source of danger. It is very generally admitted that measles are more severe and attended with more danger in adults than in children. Dr. Montgomery dissents from this doctrine, and states that, as far as his experience enables him to judge, he should pronounce exactly a contrary opinion. (*Cyc. of Pract. Med.*) The most severe cases of measles which have come under our notice, have certainly been in adults. The character of the prevailing epidemic, and the peculiar type of continued fever of the same period, should be carefully weighed in forming the prognosis, as well as in determining the treatment of measles. The season of the year has a more important influence on the issue than on scarlatina or variola : the complaint is more likely to proceed favourably and safely in mild than in cold damp weather. When measles quickly succeed to other infantile disorders, as pertussis or remittent fever, the danger to be apprehended is greatly increased : the same may be said when it attacks children disposed to affections of the brain or to scrofula. The following are the general circumstances which denote danger :—unusual violence of the eruptive fever, especially if attended with spasmodic twitches or convulsions ; the eruption appearing late, and of dark livid colour ; the supervention of thoracic or abdominal inflammation ; severe headach, with nocturnal delirium ; retrocession of the rash ; extreme dyspnœa, coming on late in the disease with dusky flush on the cheeks and livid lips ; the accession of typhoid symptoms ; the appearance of petechiæ, or profuse hæmorrhages from mucous surfaces.

A favourable prognosis may be pronounced when the eruption appears at the usual time, and proceeds regularly over the whole body and limbs ; by the mildness of the bronchial affection ; by the appearance of moderate diarrhœa ; by the softness of the pulse ; by the uniformly warm and moist state of the skin, and by the return of sound refreshing sleep.

Causes. On this subject Dr. Williams states, " there is not any trace in medical history of the origin, or primary cause, of the measles. Aaron, a physician of Alexandria, contemporary with Mahomet, and the first mentioned writer on this subject, does not speak of the small-pox and measles as new or unusual diseases. Rhazes took it for granted that small-pox and measles were known to Galen more than 600 years before his time, being misled by some incorrect translation of Galen's works into the Arabian language. The passages which he quotes have certainly not the least relation to those diseases. Indeed, no description of them, nor the slightest collateral hint, appears in the writings of the Greek physicians, which could lead us to suppose they had any knowledge on the subject." Some modern writers have held a contrary opinion, and a controversy founded on very slight and unsatisfactory evidence, was carried on with ardour during a part of the last century, to which it is unnecessary more particularly to allude.

The measles, like scarlatina, now prevail in every climate, and at every season of the year, frequently without our being able to trace them to any particular source ; so that we must infer that a morbillous poison is always in existence, and ready to infect the predisposed. It seems to be a law of this and similar poisons, that they vary greatly in intensity at different periods ; and thus the measles are frequently observed to prevail epidemically rather than sporadically, breaking out with great violence for a certain time and then declining. The disease, however, is more common in open mild winters, and during the spring, than in the summer and autumn.

Though incident to every period of life, measles are more commonly observed in childhood, at which period the human constitution is very suscep-

tible of this and similar diseases. It is admitted by all observers, that the body of a person labouring under rubeola generates a poison, which, either by contact or diffusion through the atmosphere, is capable of producing a similar disease. Measles are, therefore, both contagious and infectious. The contagious nature of this disease has often been proved by direct inoculation, either with blood drawn from the arm of a morbillous patient, or with serum taken from the vesicles, which are occasionally intermixed with the eruption. Dr. Home appears to have been the first who ventured about the year 1750 to inoculate for measles with the blood of an infected person, and his experiments have been repeated by Vogel, Brown, Monro, and Tissot, and the result led them to suppose that a mitigated and mild form of rubeola followed. Similar experiments however, made by Cullen, Girtannec, Rosenstein, and Vaidy, were not attended by such mitigation of the symptoms, as in their opinions warranted the continuance of the practice. In the year 1822, however, Professor Speranza, in an epidemic which prevailed at Mantua, inoculated himself and six boys in the manner recommended by Home; they all took the disease, which ran a mild and regular course. (Williams, *op. cit.*) Dr. Willan inoculated three children with the fluid contained in the vesicles, which sometimes appear in the course of rubeola, but no effect was produced by the inoculation. He relates the case of a lad eighteen years of age, who was inoculated with this lymph and with vaccine virus on the same day. The vaccine vesicle ran its regular course, and after its decline on the sixteenth day, from the inoculation, the primary fever of measles set in, which was followed by an attack of the rubeola vulgaris. Three children of another family were infected from him. The general evidence in favour of the doctrine of the infectious nature of measles is strong, and is admitted by all writers. The rapid spread of the disease in families, schools, and other establishments for children, and the difficulty of protecting susceptible persons who happen to associate with the affected, are facts which establish the accuracy of this proposition.

It is rarely that individuals are affected by this poison twice in the course of their lives. Dr. Willan affirmed (*Medical Facts and Experiments*) that, after an attention of twenty years to eruptive complaints, he had not met with an individual who had twice suffered from the rubeola vulgaris; but admits that those who have been attacked by the rubeola sine catarrho are not rendered insusceptible to a second attack. Dr. Home (*Trans. of a Soc. for the Imp. of Med. and Chir. Knowledge*), says that it was not uncommon for measles to attack the same person twice; and Dr. Baillie, whose authority may be esteemed equal to that of Willan, published two papers, which prove decisively that measles may occur a second time in the same individual, accompanied by their peculiar febrile and catarrhal symptoms. Similar cases are recorded by Dr. Webster. (*Med. Chir. Trans.*, vol. xxii.) It would thus appear that the poison of rubeola as well as that of vaccinia, variola, and scarlatina, may infect the human system a second time. The experiments by inoculation appear to prove that the poison is absorbed and carried into the circulation.

It is an interesting question, how long the poison remains latent before the special phenomena of the disease are manifested? Heberden saw four men that were affected with the disease on the tenth day after exposure to the infection, one on the thirteenth, and two on the fourteenth. Dr. Home in his experiments, observed that the eruption appeared on the sixth day after inoculation. In the case of successful inoculation recorded by Willan, the disease commenced on the sixteenth day after inoculation, but the vaccinia ran its course in the interval. The period of latency, therefore, may vary from six to sixteen days. Various conjectures have been entertained respecting the stage of the disease at which the virus of rubeola is generated. Many think that the poison is not disseminated till after the appearance of the eruption, while others believe this may take place during the primary fever. We incline to this latter opinion.

Treatment. The eruptive stage of measles being seldom attended with

danger, requires but little interference. It is chiefly necessary to pay attention to the regular action of the bowels, to confine the patient to bed in a moderate temperature, and to a light farinaceous diet, with cooling and demulcent drinks. The heat of skin about the period of the appearance of the rash is often considerable; but it is certain that the measles neither require nor bear the free application of cold to the surface of the body, which is so grateful and salutary in scarlatina, where the heat of skin is distressing; a cool apartment and light bedclothes, with moderate allowance of cooling drinks, is all that is required. The remedies which are often administered at this stage of the disease with the intention of exciting diaphoresis, are seldom attended with benefit; and the emulsions, which are so commonly prescribed, have but little control over the accompanying bronchial affection.

The treatment now mentioned is in many cases all that is necessary throughout the course of the disease. Willan however adds, that "an emetic given on the second or third evening somewhat alleviates the violence of the catarrhal symptoms, and contributes to prevent the diarrhœa which usually succeeds the measles." The mildness of the catarrhal symptoms should not lull the practitioner into security, but it should be remembered that active pulmonary inflammation may come on at any period of the complaint. It is generally upon the decline of the eruption that this danger is to be apprehended; but it is necessary to be alive to the possibility of pulmonary inflammation arising at any stage of measles, and by frequent examination of its physical as well as general signs to detect its first approach.

The tendency to pulmonary inflammation has raised the question, whether bleeding ought not to be adopted as a precautionary part of the treatment of measles, or whether it should be postponed until pulmonary symptoms have come on? Sydenham was an advocate for bleeding in every stage of measles, when the eruption was at its height, when the difficulty of breathing and catarrhal symptoms were urgent, and when the diarrhœa was obstinate. Dr. Heberden contends, that "bleeding with such medicines as the occasional symptoms would require in any other fever, is the whole of the medical cure requisite in the measles. (*Commentaries*, p. 321.) Cullen does not appear to have resorted to bleeding in measles, unless particular local symptoms rendered it necessary. Dr. Williams cautions the practitioner "to remember, even when these local lesions are most severe in measles, that they depend on the action of a morbid poison, have a certain course to run, and are consequently less amenable to antiphlogistic treatment than similar lesions depending on simple inflammation." (*Op. cit.*) Bleeding, therefore, is not to be regarded as a remedy always necessary in measles, although blood may be taken from the system with much less risk in this than in any of the eruptive fevers. In all cases where pulmonary inflammation exists, blood should be taken freely from the arm; but it should be remembered, that although some children bear the loss of blood well, there are many who are long in recovering from its effects, even when the quantity taken has been small: hence, in children of tender age, it is more prudent to take blood in small quantities by cupping, or by leeches applied to the chest, selecting some spot where there is a solid resistance to pressure, should it become necessary to restrain the bleeding. The quantity of blood taken should be more moderate during the eruption, than if the symptoms indicate loss of blood after its subsidence, because many urgent symptoms become mitigated when the rash disappears.

Antimony, ipecacuanha, and blisters, may be employed to assist the abstraction of blood. Sydenham prescribed an opiate every night throughout the whole course of measles; but in the early stages of the complaint, and particularly in children, it is seldom attended with beneficial results. As an occasional remedy in the latter stages, and where free depletion has been resorted to, as recommended by Sydenham, opiates may be useful. If the powers of the child do not forbid it, and there be no tendency to diarrhœa, one or two doses of calomel and rhubarb should be given at the termination of the disease.

The diarrhœa which so frequently occurs at the close of measles, appears to alleviate the pulmonary symptoms, and, according to Bateman, "to prevent some other of the troublesome sequelæ of the disease." Hence this natural evacuation should not be arrested at once, but the secretions regulated by mercurial alteratives. If the diarrhœa be protracted, we may find it necessary to prescribe a few leeches or a blister to the abdomen, with slight astringents, an occasional warm bath, and a farinaceous diet. Dissections (Rayer, *op. cit.*, ROUGEOLE) after death have shown that, in such cases, inflammation of the mucous membrane of the intestines and enlargement of the mesenteric glands have existed.

It sometimes happens that the rash comes out imperfectly, or, having appeared, suddenly recedes and disappears: if the retrocession have followed exposure to cold, the use of the warm bath, diaphoretics, warm and slightly stimulating drinks, and perhaps a mustard poultice to the chest or abdomen, are the remedies most likely to be beneficial; should it disappear from debility, a more stimulating plan must be adopted, not because the rash has suddenly disappeared, but on account of this condition of the general system, which, if allowed to continue, might hazard the patient's safety. Dr. Bateman once met with a case of this kind, where the fading efflorescence became mixed with petechiæ, and as there was apparently no local congestion, the decoction of cinchona with sulphuric acid and a little wine were administered, and the child speedily recovered.

Treatment of malignant measles. When the disease presents this type, the mortality will be great under any plan of treatment. We believe that it is essential to seize the earliest opportunity of relieving the congested organs by a small bleeding, if the age and powers of the patient admit of loss of blood. The period when venesection may be employed quickly vanishes, and typhoid fever supervening, the practitioner is restricted to local abstraction of blood. A nutritious diet, with the use of diffusible stimulants, as wine or ammonia, may be advantageously combined with depletion. If the typhoid symptoms be not urgent, but insidious pneumonia, or bronchitis, or gastro-enteritis, continue, they must be treated on the same principles as would guide the practitioner in the management of similar complications arising in common continued fever.

SCARLET FEVER, OR SCARLATINA.

Characteristic symptoms. — Varieties. — Scarlatina simplex. — Scarlatina anginosa. — Scarlatina maligna. — Scarlatina sine exanthemate. — Sequelæ. — Anatomical characters. — Causes. — Diagnosis. — Prognosis and Mortality. — Treatment. — Prophylaxis.

THIS term (*Scarlatina*), for which there is no classical authority, appears to have been introduced into medical literature by Sydenham, A. D. 1670, and adopted by Morton and subsequent authors.

Scarlatina, or Scarlet Fever, is a febrile disease of a contagious nature, characterised by scarlet efflorescence of the skin and of the mucous membrane of the fauces, generally commencing about the second day of the fever, and declining about the fifth, being in most cases accompanied by inflammation of the throat, and occasionally of the submaxillary glands.

There is considerable difference in the type of the fever which precedes and accompanies the eruption, which not only modifies the disease in individual cases, but influences also the general character of epidemics. Sometimes the febrile excitement is so slight, as to be scarcely perceptible; at others all the

symptoms of active inflammatory fever are present; while it sometimes happens, that an epidemic has been stamped throughout by fever of a typhoid or malignant form.

The varying character of scarlet fever in different epidemics may, in some measure, account for the confusion which prevailed on this subject before the time of Sydenham, who had evidently witnessed its mildest forms only. Cases of a more severe description were certainly observed by Morton (*De Morbillis et Febre Scarlatina*), who regarded them as an aggravated species of measles, in which the eruption had assumed a confluent form. Subsequent authors continued to maintain the identity of scarlatina and measles, until the comprehensive descriptions of scarlet fever by Dr. Withering and Dr. Willan appeared.

Varieties. There are several forms of scarlet fever, each of which requires a separate description. It has already been stated, that the poison of scarlatina usually exhibits its effects upon two membranes; namely, on the skin and the mucous membrane of the fauces; to one or other of which, however, its action may be restricted. Hence arise the varieties of scarlet fever, in accordance with a well-established law of the action of other poisons, "that they may exhaust themselves on one or more of the tissues they usually affect, without involving the whole series; and that they act with greater or less intensity, according to the peculiar idiosyncracy of the patient." (Dr. R. Williams, *Elements of Medicine*, vol. i. p. 131.)

In the most simple form of scarlatina the fever is seldom of an active kind: the cutaneous efflorescence appears in the usual manner, but there is no inflammation of the mucous membrane of the throat (*Scarlatina simplex*).

In the second there is greater febrile excitement, and the general symptoms are further complicated by inflammation of the fauces (*Scarlatina anginosa*).

In the third the symptoms are of a more severe description. The fever, which is of a typhoid type with great depression of the vital powers, is sometimes accompanied with diphtheritis, or sometimes with gangrenous inflammation of the throat, and generally with tumefaction of the parotid and cervical glands, and acrimonious discharge from the nostrils and ears (*Scarlatina maligna*).

In a fourth variety the efflorescence does not appear upon the skin, but is confined to the mucous membrane of the mouth and throat. Although this form has not been described by Dr. Willan as a distinct variety, it was often witnessed by him. (*On Cutaneous Diseases*, p. 273.) Dr. Tweedie, in his valuable essay on scarlatina (*Cyc. Pract. Med.*), has designated this variety *Scarlatina faucium.* Dr. Williams (*op. cit.*) has described it as *Scarlatina sine eruptione.*

1. *Scarlatina simplex.* This variety commences with the ordinary precursory symptoms of fever,—cold chills, shivering, nausea, and sometimes vomiting, succeeded by hot skin, frequent pulse, and thirst. In some cases the febrile disturbance is so trivial, as scarcely to be noticed; in others it is severe, the prostration becomes great, the pulse rises in rapidity, the heat of skin is pungent, and the headach is sometimes accompanied with transient delirium.

Some discrepancy of opinion prevails among authors respecting the period at which the efflorescence begins to appear. Heberden asserts that it is visible on the first or second day. According to Willan (*op. cit.*, p. 255.) numerous patches of a vivid red colour appear about the face and neck on the second day; while Cullen states that it is deferred until the third or fourth day. Another more recent and careful observer, Dr. Tweedie, makes the following judicious remarks on this subject:—"It is probable that, in the majority of instances, the rash comes out on the second day of the fever; and that in cases in which it appears sooner or later, there is some peculiarity in the individual or the disease to account for the variation." In cases in which we have had an opportunity of observing the disease from the commencement, the eruption has been visible on the face on the second day of the illness.

The rash at its commencement is perceptible on the face, neck, and breast, but gradually extends itself over the trunk and limbs, so that generally,

after twenty-four hours, the whole body is covered with the eruption. The efflorescence consists at first of innumerable red points or spots, separated by interstices of skin of the natural colour. These small spots quickly coalesce, so that, in the course of a few hours, the redness is pretty generally diffused.

On the face, neck, and upper extremities, the efflorescence is uniform and continuous; but over the trunk it is diffused in large, irregular patches. It is of a more vivid hue on the loins, nates, and the flexures of the joints, than in other parts of the body.

The efflorescence is often accompanied with a perceptible roughness, which is most evident upon the extremities and front of the body, giving a sensation as if the skin were covered with granules. It arises from enlargement of the cutaneous papillæ, and has the appearance of a papular eruption. Where the congestion of the cutaneous vessels is very intense, and particularly where the patient has been subjected to a heating regimen during the treatment, small miliary vesicles occasionally appear on different parts, more frequently on the trunk. The rash on the fifth day generally begins to decline, the scarlet hue becoming gradually more pale; on the sixth day its appearance is very indistinct, and it is wholly gone before the eighth day.

About the fourth or fifth day of the efflorescence, an eruption of semi-globular vesicles, containing a thin pearl-coloured serum, has been occasionally observed about the forehead, neck, chest, shoulders, and extremities. They vary in size, and succeed one another without determinate order. When punctured they are sometimes found empty or nearly so, the fluid having been absorbed.

The occasional appearance of these vesicles at the *acmé*, and during the decline of the efflorescence of scarlet fever, has been noticed by Withering, Willan, Rush (*Med. Obs. and Inq.*) and others. Vogel, Burserius, and Sauvages, from their occasional appearance, attempted to establish another variety of this disease, under the name of *Scarlatina pustularis* or *variolosa*. We have seen cases in which this secondary eruption of vesicles closely resembled varicella in the form of the vesicles, and in the irregularity of their succession. Similar phenomena are occasionally observed in the other exanthemata: they probably depend upon the degree of congestion of the cutaneous capillaries in different cases.

The efflorescence in the scarlatina simplex commonly terminates by desquamation of the cuticle, which begins about the end of the fifth day on those parts where the eruption first appeared, and gradually proceeds over the body in the same order as the rash came out. The desquamation from the face, neck and trunk, is usually in the form of scurf; while large portions of cuticle are detached from the hands and feet: occasionally the cuticle of the palm of the hand, or sole of the foot, is separated entire.

Such is the ordinary progress of the efflorescence on the surface of the body: but the mucous membrane of the mouth, fauces, and nostrils, is generally more or less affected at the same time; the lips, the edges of the tongue, the soft palate, the pharynx, the nostrils, and even the internal surface of the eyelids, being of a bright red colour. The papillæ of the tongue become considerably elongated, their red points projecting through the thick mucus which covers its surface: when that organ is clean, or morbidly red, the elongated, enlarged, and deep scarlet papillæ give it a very characteristic appearance.

The affection of the mucous membrane of the mouth and fauces, which is not constant in the scarlatina simplex, terminates by resolution; and with the disappearance of the rash the febrile symptoms subside, the disease terminating at the end of a week, though it often leaves the patient in a state of considerable debility.

2. *Scarlatina anginosa.* In this variety the precursory symptoms are more violent than in the preceding. In some cases the first symptom is sudden stiffness of the muscles of the throat and angles of the jaw, accompanied by uneasiness in swallowing, which on the second day becomes more painful and difficult, the sufferings of the patient being rendered more distressing by

constant efforts to expel a viscid secretion from the mucous crypts of the tonsils and pharynx. Upon examining the throat, there is considerable swelling of the tonsils, uvula, and soft palate, with florid redness of their surface, which extends to the posterior part of the fauces. In severe cases small patches of a darker hue are observed on the inflamed membrane, at which points there is often an exudation of coagulable lymph, of a greyish-white appearance, which, unless examined with care, may be mistaken for sloughs of the mucous lining; but by directing the patient to clean his throat by means of a gargle, by which this exudation may be removed, the mucous membrane will be found entire, and free from any loss of substance. These crusts of lymph, which are renewed from time to time, extend according to Rayer (*Traité des Maladies de la Peau*) into the lateral parts of the pharynx and œsophagus, but not into the larynx or trachea. This coincides with the observation of Dr. Tweedie, who states, that in the dissections of scarlatina anginosa which he has made, he had not seen an instance of membranous exudation extending to the larynx.

In some cases the fever precedes or accompanies the sore throat; in others it is delayed until the appearance of the efflorescence. It is generally, from its commencement, of a more active kind than in scarlatina simplex, indicating a severer form of disease. On the second or third day, as the inflammation of the throat becomes more urgent, there is generally a considerable increase of the febrile excitement; the debility is greater; the pulse more frequent, and of unequal strength; the respiration oppressed; the temperature of the skin rises to 106° or 108°, sometimes to 112°; there is urgent thirst; and the tongue, especially at its tip and edges, assumes a scarlet hue, while its papillæ are much enlarged. As the evening approaches, there is an exacerbation of fever with extreme restlessness, and often delirium, during the night.

In this variety, the efflorescence does not observe the same regularity as in the scarlatina simplex. It does not appear so early, but is often delayed to the third or fourth day, and generally comes out in scattered patches on the chest and arms. In some cases it is entirely confined to the back of the hands and wrists, and sometimes wholly vanishes the day after its appearance, and reappears partially at uncertain times, so that its whole duration is longer than in scarlatina simplex. About the fifth or sixth day it begins to grow sensibly paler, following the same order in its decline which it had previously observed on its appearance, subsiding first on those parts which it had primarily occupied. Desquamation of the cuticle frequently follows the disappearance of the rash, though this is by no means an uniform occurrence, seeming in some measure to depend on the intensity or duration of the previous eruption; for when the latter has been slight and of an evanescent character, desquamation seldom follows.

The fever and inflammation of the throat begin to abate with the fading of the eruption, though sometimes the sore throat and some degree of fever continue for a week or ten days after the rash has entirely disappeared.

The above description is intended to apply to scarlatina anginosa, as it is usually observed. It sometimes however assumes an aggravated form; thus, in addition to the symptoms already enumerated, there is sometimes acrid discharge from the nostrils and ears, frequently accompanied with deafness or inflammation of the parotid and cervical glands, terminating in suppuration of the cellular tissue. But although these occasional complications tend to keep up the febrile excitement, and to prolong the duration of the disease, they do not materially add to the danger, as they generally subside in a few days after the disappearance of the more characteristic symptoms of the disease.

During the progress of scarlatina the attention of the practitioner should be constantly directed to the state of the internal organs. Dr. Tweedie, in enumerating the complications of scarlatina, directs attention particularly to the great disposition to inflammations of the serous membranes; so that, when an organ becomes inflamed during the progress of scarlet fever, the serous membrane is much more generally the seat of inflammation than the paren-

chyma. There are few practitioners who have had much experience of scarlet fever, who have not had cause to lament the loss of patients from meningeal, pleuritic, or peritoneal inflammation.

3. *Scarlatina maligna.* This variety, proposed by Dr. Willan and adopted by subsequent writers, was described by Cullen under the title of *Cynanche maligna.* A reference to his description will at once show that he described a severe form of scarlatina. Dr. Fothergill, in his *Account of the Sore-throat attended with Ulcers,* which prevailed as an epidemic in London in the years 1747-8, has also described this malignant form of scarlatina; and the epidemic which prevailed from 1751 to 1753, of which Dr. Huxham has given an account (*On Fevers and Sore-throat*), was undoubtedly the scarlatina maligna of Willan: indeed, in his *Essay on the Malignant Ulcerous Sore-throat,* he admits its great resemblance to scarlatina anginosa; and that "truly some of the scarlet fevers mentioned by Morton were not much unlike it."

Although at its commencement the symptoms of scarlatina maligna differ little from those of the scarlatina anginosa, yet at an early period its formidable nature becomes apparent. Thus the fever assumes a typhoid form, the heat of skin is less intense, and there is great disorder of the functions of the sensorium, with small, frequent, and often irregular pulse. There is at the same time dull redness of the eyes, with a dark red flush on the cheeks; the patient is restless, fretful, and at times delirious; the delirium is sometimes violent, but more generally it is of the low muttering kind. The tongue quickly becomes dry and brown, or red, dry, and glazed, and often so tender and chapped, that a slight touch causes it to bleed; the teeth and lips are covered with sordes, and the odour of the breath is extremely fetid. The throat has a dusky red appearance; there is not much swelling, but dark incrustations form on the velum, uvula, and tonsils, which are not as has been generally supposed, sloughs, but merely exudations of lymph or false membranes. In some cases, however, there is gangrenous inflammation of these parts, which are destroyed by the sloughing which succeeds. There is at the same time acrid excoriating discharge from the nostrils, and a viscid secretion from the fauces, impeding respiration and producing a rattling noise. The inflammation in severe cases spreads to the posterior pharynx, which, though not much swollen, is so irritable, that on attempts to swallow fluids they are rejected through the nostrils. The inside of the lips and cheeks is frequently covered with aphthæ, and the cervical and submaxillary glands become inflamed, abscesses occasionally forming in the surrounding cellular tissue.

The rash is extremely irregular as to the time of its appearance and duration. It often comes out at a late period of the disease, and disappears after a few hours; or it vanishes suddenly, and is again renewed several times in the course of the disorder. Its colour is generally paler than in the other varieties, except that here and there, in irregular patches, it assumes a deeper hue. In some cases there is great tendency to hæmorrhage from the mucous surfaces, either from the nostrils or throat, intestines or urinary canals; petechiæ often appear upon the skin, and the patient rapidly sinks, unless the constitution has been previously very vigorous. Dr. Tweedie has, in a few instances, seen the large joints become extremely painful and swollen with evidence of fluctuation: the patient is generally destroyed in a very short time. Patients who withstand the violence of the early symptoms, have often to struggle against a series of most untoward circumstances for a considerable time. Some die from exhausting diarrhœa; others sink suddenly and unexpectedly, after giving hope of recovery; sometimes death takes place from the supervention of serous inflammation and its consequences. Even when scarlatina at its onset has been of the mildest form, it sometimes happens that its whole aspect becomes suddenly changed, and the symptoms assume a malignant character; and when the disease is epidemic, it often exhibits in different persons of the same family every gradation, from the slightest to the most malignant form of the disease.

In many instances this malignant variety of scarlatina terminates fatally on the third or fourth day, and Dr. Willan says, "as early as the second day, no symptoms having preceded which could excite an apprehension of immediate danger. In the severe epidemic described by Dr. Withering, similar instances are recorded. Dr. Tweedie describes cases terminating fatally "on the second, third, or fourth day, without the practitioner being able to assign any satisfactory reason, or discover any lesion on the most careful examination of the body." These opinions are confirmed by the observations of Mr. Hamilton (*Edin. Med. and Surg. Journ.*, vol. xxxix.), and by Dr. Sandwith in his account of the Bridlington epidemic. Dr. Willan has justly remarked, that in cases terminating fatally so soon after the accession of the fever, the throat has probably been longer affected, and that the poison had gradually pervaded the whole constitution; hence the sickness, shiverings, languor, delirium, and coma, do not, in such instances, denote the commencement of the fever, but are the final symptoms of an insidious and most virulent distemper. We have met with a few cases of this description which terminated rapidly with œdema of the face and profound coma.

4. *Scarlatina sine exanthemate.* In this form, the specific action of the poison is limited to the mucous lining of the mouth and fauces, the scarlet efflorescence of the skin being wanting. Cases of this description frequently occur when the disease prevails epidemically. It was the opinion of Dr. Willan, that this complaint was peculiar to adults: we have, however, known a case in a child of five years, which terminated fatally.

When scarlatina exists as an epidemic, this variety is sometimes observed simultaneously with the other forms of the disease in individuals of the same family. Dr. Willan contends, that "it is evidently a species of scarlatina, because it affects some individuals of large families, while the rest are labouring under other forms of scarlatina, *and because it is capable of communicating by infection all the varieties of that disease.*" The author has had good opportunities of confirming this opinion of Dr. Willan. The same learned writer thus continues, "Persons who have previously gone through the scarlatina anginosa, experience while conversant with the sick very uneasy sensations in the throat; in some there is an inflammation and swelling, or ulceration, of the tonsils, producing considerable pain and irritation, but without the specific fever and efflorescence." Dr. Johnstone, in his description of the epidemic which prevailed at Worcester in 1778, states, that while some individuals at the first seizure were covered with the scarlet efflorescence, others of the same household had the ulcerated throat without any eruption of the skin; and that, in some instances, patients suffering from anginose inflammation without the rash, have communicated the disorder to others, in whom it has appeared as an eruptive disease. Dr. Tweedie has recorded similar instances. "It may appear singular," says Dr. Willan, "that one of the slightest of the eruptive fevers and one of the most violent, that epidemics which vary as much in fatality as a fleabite and the plague, should be associated together and spring from the same origin, Experience however decides, that the scarlatina simplex, the anginosa, the maligna, and the scarlet sore-throat without the efflorescence on the skin, are merely varieties of the same disease; and that all of them proceed from the same source of contagion."

Sequelæ. It often happens, when scarlatina is apparently advancing towards a favourable termination, that recovery is retarded, and sometimes even life destroyed, by the supervention of certain local affections, which are to be regarded as accidental complications or sequelæ. Some of these have already been adverted to. The great tendency to inflammation of the pleura, peritoneum, and more rarely of the arachnoid and pericardium, in the course or during the decline of the fever, has been mentioned. In certain epidemics, moreover, the disease is prolonged, and its mortality increased by the supervention of bronchitis or gastro-enteritis. More rarely still the disease is fol-

lowed by purulent deposits in the large joints, or by gangrene of some portions of the extremities.

Dropsy is an occasional consequence of scarlatina. It occurs more frequently in the form of anasarca of the face, eyelids, and lower extremities; but occasionally becomes general. Sometimes the effusion takes place in the different serous cavities; and, when this happens, the result is very doubtful. Dropsy succeeding to scarlatina is noticed by many writers, who appear to have arrived at very different conclusions as to its importance; Morton, the first English author who has given a full account of scarlatina, notices it, and evidently regarded it as of serious import. (*Op. cit.*, cap. iv.)

In the account of scarlatina, as it prevailed at Vienna in 1762, Plenciz states, that the dropsy which succeeded the disease was more dangerous than the primary fever. (*Willan*, p. 235.) Drs. Sims and Wells however, who published histories of the epidemic scarlatina of 1786, appear to think anasarca a symptom of trifling importance. (*Trans. of Soc. for the Imp. of Med. and Surg. Knowledge*, vol. iii.) Cullen, Bateman, and Armstrong, pass over this complication with slight notice. Dr. Blackall (*Observations on Dropsies*) first observed the albuminous state of the urine in many of these cases; and the subject has recently acquired fresh interest and importance by the discovery of Dr. Bright, that albuminous urine is frequently associated with structural changes in the kidneys. (See Dropsy.) It is singular that the dropsy has been remarked to succeed to the mild as often as to the severe forms of the disease; and that it has never been observed to supervene in cases of scarlatina maligna. Children are much more frequently attacked than adults, but it is more common in the latter than is usually supposed. It generally comes on in ten or twelve days from the disappearance of the rash, but sometimes earlier and sometimes later. Its approach is generally announced by paleness of the countenance, a leucophlegmatic aspect, increasing languor, loss of appetite, furred tongue, costive bowels, scanty and turbid urine, and often considerable gastric disturbance. The swelling more frequently begins on the face and hands, to which it may be confined; but in general it extends till the whole body becomes œdematous. There is but little to be apprehended so long as the serous effusion is confined to the subcutaneous cellular tissue; but when it takes place in the cavities, the danger is imminent. When the fluid is effused into the ventricles of the brain, the swelling of other parts of the body often partially subsides. Drowsiness, coma, and convulsions supervene, which generally prove fatal. Another source of danger is the rapid accumulation of fluid in the chest, which is commonly preceded for some time by general anasarca, and the suddenness of the effusion is in some cases remarkable. As serous effusions are to be regarded as secondary affections resulting from some previous morbid action, it is of importance to ascertain their cause. On this subject Dr. Blackall remarks, "There is something hitherto obscure in the disposition to œdema which scarlatina leaves. The time, the symptoms, and the subjects of this attack, by no means permit the opinion that it originates in mere debility. On the contrary, the attendants are often persuaded that the patient has caught some fresh cold; and it is certainly not improbable, that the previous inflammation and irritation of the skin may be followed by an opposite state of it, incapable of supporting even the common changes of temperature."

Dr. Tweedie regards the dropsy as arising from increased action in the sanguiferous system. That this is the cause of the effusion, if not invariably at least in the majority of instances, and certainly in all those which have come under his observation, was evident from the character of the pulse as to frequency and power, the coagulable urine, the rapidity with which the fluid accumulated (if not arrested by prompt treatment), and from the efficacy of bloodletting, purging, and other antiphlogistic measures, which were generally necessary to remove the dropsical effusion. We fully coincide in the opinions of these two practical physicians. Mr. Hamilton has attempted to show that

the kidneys exhibit traces of commencing disorganisation, and thus to account for the dropsy and albuminous urine. (*Edin. Med. and Surg. Journ.*, vol. xxxix.) But it is now well-known, that the albuminous urine may be secreted where the structure of the kidney is healthy; and no instance is known of recovery from dropsy with granular degeneration of the kidney, but recovery from dropsy after scarlatina is frequent.

Anatomical characters. The morbid appearances on the dissection of fatal cases of scarlatina are by no means uniform. Dr. Tweedie states, that he has frequently been surprised, in examining rapidly fatal cases, to find no morbid appearances that could explain the cause of death: in such instances it is more than probable, that the diseased condition of the blood and fluids has had an important share in the fatal issue. The most uniform specific action of the poison during life is upon the skin, producing the exanthema or rash; but as this consists simply of intense congestion of the cutaneous capillaries, it speedily vanishes after death. The skin in some places is florid, of a dark red colour; and in others there are livid spots and petechiæ, these latter being produced by extravasation of blood into the cutaneous and subcutaneous cellular tissue. In fatal cases of scarlatina anginosa, dissection often reveals a congested state of the mouth and pharynx. These organs exhibit a deep red tinge, which in some instances extends to the trachea and bronchi: there is generally swelling of the tonsils and the adjacent parts, which are frequently covered with coagulable lymph. In scarlatina maligna, however, these appearances are not observed, or at least the tumefaction of the throat is generally trivial; but the lining membrane has a dark livid colour, sometimes abraded, and frequently covered with exudations of dark-coloured lymph, which have often been mistaken for sloughs. It often happens however, even where the inflammation of the throat has been most severe and distressing during life, that no traces of its existence are discoverable after death.

In some epidemics it has been observed, that the inflammation of the mucous membrane is much more extensive. In the epidemic which prevailed in Edinburgh during the autumn of 1832, described by Mr. Hamilton, and wherein he attended 150 patients, almost every severe case had more or less of the chest affection; and he mentions only one fatal case, in which it was not evident from the appearances after death, that violent inflammation had extended to the larynx, trachea and lungs. (*Edin. Med. and Surg. Journ.*, vol. xxxix.)

The abdominal viscera are rarely affected, although occasionally the mucous membrane of the intestinal canal is red and injected; sometimes the peritoneum exhibits marks of previous inflammation with effusion of fluid into the abdominal cavity.

The appearance of the kidneys is not uniform, apparently depending upon the existence and duration of dropsy. Where patients have sunk early in the disease, these organs have generally been found healthy; in protracted cases they sometimes exhibited a mottled and granulated appearance. When dropsy had appeared before death Mr. Hamilton found the alterations in the kidneys much more decided, presenting the appearance of the first stage of *Bright's disease*, the alteration of structure being generally in proportion to the duration of the disease. The cortical substance however never presented, except very slightly in one case, the granular appearance seen in the more advanced stages of Bright's disease; nor was the tubular structure ever encroached upon, which is perhaps, from the recentness of the attack, just what we should expect. Should these apparently progressive alterations of structure in cases of dropsy with albuminous urine consecutive to scarlatina be confirmed, the highly probable opinion entertained by Dr. Graves will be strengthened, viz. that the mottled degeneration of the kidney (Bright's disease) is not to be regarded as the cause of the secretion of albuminous urine; but, on the contrary, that it is the progressive and long-continued faulty elimination of albumen with the urine, which produces the gradual change in the cortical portion of the kidney.

When the primary fever has terminated fatally after violent delirium, Dr.

Tweedie has found the arachnoid membrane vascular or even opaque, with effusion of a serous or sometimes milky fluid underneath: in such cases the substance of the brain is also congested.

When purulent deposits take place in the joints, a morbid condition observed in the London Fever Hospital, there are rarely marks of inflammation in the synovial membrane. Dr. Tweedie is inclined to think, that the pus deposited in the joints is not the consequence of inflammatory action, but that it is deposited from the blood, in the same manner as is sometimes observed in other parts of the body.

Scarlatina appears to be a contagious as well as infectious disease. Its contagious nature has been demonstrated by inoculation. The serum of the vesicles, which sometimes appear in scarlatina, has been used by Sir Busick Harwood, late regius professor of physic at Cambridge, and other physicians, to inoculate healthy children, in the hope of producing a mild form of the disease. In many instances the disease has been produced, but has proved to be as severe as that which occurs spontaneously. (Williams' *Elements of Medicine*, p. 118.)

The infectious nature of scarlatina is a doctrine scarcely disputed in the present day. The rapid spread of the disease in schools, and its frequent communication to healthy members of families when children have returned home labouring under the disease, or during convalescence, though several weeks may have elapsed from the period of desquamation, are among the more obvious proofs of its infectious nature. It is also the opinion of those who have had much experience of this disorder, that clothing, bedding, or furniture of a room, which have been used by patients during this disease, are all capable of infecting healthy individuals. It was the opinion of Dr. Willan, founded upon an experience of 2000 cases, that scarlet fever having once run its course, the constitution was afterwards insusceptible to a second attack. Exceptions to this supposed law, however, are numerous; those who have once experienced the specific actions of the poison, when exposed to its influence at some future period, are not infrequently attacked with *Scarlatina sine exanthemate.* Sir Gilbert Blane met with an instance of its occurring thrice in a young lady, "without the least suspicion of ambiguity or possibility of mistake." (*Med. Chir. Trans.*, vol. iii.) Analogous instances of the recurrence of small-pox, and other exanthemata might be adduced in support of this statement. The period which elapses *after exposure to the influence of the poison*, before it produces its specific effects, probably varies from twenty-four hours to about ten days. In one case, in which the virus was introduced by inoculation, Rostan says, that seven days elapsed before the appearance of the eruption. (*Clin. Méd.*, tom. ii. p. 206.)

Causes. Epidemic scarlatina occurs more frequently in the autumn months after a warm summer, especially when the heat has been accompanied with continued rains, and when the succeeding winter has been open and mild. It generally disappears during the spring months, though in some epidemics it prevails in every month of the year. It occurs more frequently in the early than in the advanced periods of life, and in females than in males; so that childhood and the female sex appear to be more predisposed to the disease than manhood and the male sex. Children and females are much more exposed to the influence of the poison than men, and perhaps all children are susceptible of the influence of the poison; whereas many adults having passed through the disease in childhood may be said to be almost exempt from future attacks.

Dr. Clark has given a tabular view of the cases under his care in 1778 and 1779, from which it appears that children under ten years of age were most liable to the disease; that under twenty years of age the number of males and females was almost equal; but that above this period the number of females greatly exceeded that of the males. (Cited by *Willan*, p. 344.) Dr. Tweedie has given a similar table of cases of scarlatina admitted into the London Fever

Hospital, from which (omitting the cases under ten years of age, as few of that age are admitted into the metropolitan hospitals) the same results are obtained. Of 146 cases given by Dr. Clark there were 66 males and 80 females; and of 184 cases given by Dr. Tweedie, there were 55 males and 129 females. It further appears, that the susceptibility to the disease diminishes in a very considerable degree after the age of 30; for of Dr. Tweedie's cases (184) there were only 22 between the ages of 30 and 50.

Diagnosis. The only diseases with which scarlatina can be confounded, are measles and roseola. From measles it may be distinguished by the precursory symptoms; by the time intervening between the first accession of fever, and the appearance of the rash; by the character of the eruption; and by the sequelæ. Measles commences with coryza, sneezing, suffusion of the eyes, cough, slight dyspnœa, and other catarrhal symptoms; while in scarlatina, the first sensation of uneasiness is referred to the throat. The eruption in measles shows itself on the fourth day of the fever, but in scarlatina it may usually be distinguished on the second. In measles the rash is disposed in irregular portions of a crescentic form, and is slightly elevated, so as to be sensible to the touch; in scarlatina the eruption assumes the appearance of broad patches of an indeterminate shape. The rash has a different tint in the two diseases; it is of a vivid red in scarlatina, but of a darker or raspberry hue in measles. In scarlatina the fever does not abate upon the appearance of the eruption to the same extent as in measles; the former is frequently succeeded by anasarca, inflammation of serous membranes, depositions in the joints, &c. The sequelæ of measles are principally affections of the respiratory organs, as bronchitis, pneumonia, croup.

Roseola is distinguished from scarlatina by the partial and regularly defined rash, by the absence of the angina, by the mildness of the febrile disorder, and by the short duration of the complaint. Deep rose-coloured patches, exactly like roseola, sometimes appear intermixed with the rash of scarlatina.

Prognosis and mortality. The only danger to be apprehended in scarlatina simplex is the occurrence of some internal local inflammation, or the supervention of anasarca, when the desquamation of the cuticle is completed. It must also be borne in mind, when scarlatina prevails epidemically, that a mild case sometimes suddenly assumes a malignant type. The prognosis in scarlatina anginosa is influenced chiefly by the extent and severity of the local inflammation, bearing in mind, however, that there is a natural tendency in angina to terminate in resolution. A bright florid appearance of the inflamed mucous membrane is a more favourable symptom than when it presents a dark livid aspect. But if there is excessive tumefaction of the throat and surrounding parts, and especially if the inflammation has extended to the air tubes, the disease is to be considered dangerous, and will probably terminate fatally. In some cases of this kind, œdema of the glottis supervenes, and rapidly destroys the patient. The prognosis is also unfavourable if the delirium commences, as it frequently does in children and young persons, a few hours after the seizure: in these cases a fatal result often ensues in the course of two, three, or four days. Our prognosis may often be formed from the character of the eruption. A bright red efflorescence is more favourable than a pale rash, or a dusky red, or one of a raspberry tint. When the eruption is partial and evanescent, or when its retrocession takes place suddenly at an early stage without reappearing, there is much cause for apprehension. Complete desquamation of the cuticle is a favourable sign. Scarlatina maligna being always attended with great danger, a guarded prognosis should be given.

Of the circumstances indicating a minor degree of danger, the following are the more important. It is generally supposed, that children withstand the virulence of this disease better than those of more advanced age. The absence of visceral inflammation, or of structural disease of any important organ, will also lessen the danger. A plentiful and florid eruption, a bright red colour of the fauces, and a disposition of the exudations on the throat to separate, universal

desquamation of the cuticle, the pulse falling in frequency and rising in power, the breathing becoming gentle and free, the countenance resuming its natural expression, and gentle perspiration, are indications of a favourable result.

Among the unfavourable signs are the existence of inflammation in an important organ, for the subduing of which active remedies cannot be employed; a dark or livid appearance of the eruption, more especially when intermixed with petechiæ; the sudden disappearance of the efflorescence; a small frequent pulse, with great prostration of strength; hurried respiration, not depending on active inflammation of the lungs; acrid discharges from the nose and ears; the admixture of blood in the urine or stools; involuntary evacuations; subsultus tendinum; hiccough; muttering delirium and coma; the appearance of gangrene of those parts subjected to pressure, or in the extremities.

In conclusion it may be remarked, that it is often a fatal disease when it attacks pregnant or puerperal women; and that it is generally of a milder character in the spring and summer, than in the autumn or winter months.

Hitherto we have no sufficient data for arriving at any safe conclusions respecting the *mortality* of scarlet fever. In some epidemics the disease is remarkable for its benign character, scarcely affording a single example of a fatal termination; while in others it destroys whole families, and threatens large districts with depopulation. Sydenham, who had evidently observed the milder forms of the disease only, believed scarlet fever so trifling an affection as seldom to require medical interference, and that fatal results could alone occur from the *nimia medici diligentia.* Morton on the contrary, having had his attention directed to an epidemic of extreme violence, is perhaps inclined to overrate the average mortality of the disease. A short notice of each of the most important epidemics that have prevailed during the last two centuries will be found in Dr. Williams' learned and elaborate work; and since the publication of that work, various monographs have still further enlarged our knowledge on this subject.

Treatment. In commencing this branch of our subject, it is necessary to mention a point of the utmost practical importance, namely, that in every instance the prevailing type or character of the continued fever of the period should be taken into consideration, and that the treatment found most successful in the latter, should be a guide to the practitioner in forming the principles upon which the cure of scarlatina should be attempted.

1. In *scarlatina simplex* of a mild character, but little treatment is requisite. The patient's apartment should be kept cool and well-ventilated. The diet should consist of farinaceous substances and cooling drinks, emetics may be given with advantage at the commencement of the fever. The bowels should be kept open with mild aperients. When the heat of surface is great, patients often experience much relief from sponging the body with cold water, which is sometimes followed by refreshing sleep. In strong and plethoric subjects, when the fever is high, the abstraction of blood, either from the arm or locally, may be employed as a precaution against internal inflammation, which in such cases is always to be apprehended. But however mildly this form of the disease may commence, it nevertheless requires to be watched, for it is surprising how rapidly it is often converted into the more severe inflammation of an internal organ, or anasarca may supervene when least suspected.

2. In *scarlatina anginosa* we have distinct local inflammation, and fever of a more active type to contend with. The question then naturally arises, is a disease attended by such symptoms to be treated like other inflammations, by bleeding and other antiphlogistic remedies? or is there any thing specific in the local phenomena of scarlatina which requires a modification of such treatment? The solution of this interesting problem must of course be determined by a reference to results obtained by eminent physicians from different methods of treatment. Dr. R. Williams, who has bestowed great attention on this point, has drawn up a table of different epidemics which have prevailed from 1763 to

1834; and adds, that "the conclusion which inevitably follows is, that the chances of recovery are diminished by the practice of bleeding in the ratio of nearly four to one, as compared with the chances, supposing the patient not to have been bled." From the experience of this disease which we have had, we coincide with Dr. Tweedie in the statement, that he has "seldom had occasion to bleed from the arm unless in particular instances of unusual febrile (or rather, cerebral) excitement, or when some organ was threatened with inflammation. We generally prefer the free topical abstraction of blood by cupping behind the neck, which is the most effectual mode of relieving the inflammation of the throat, or by the application of leeches under the lower jaw, or behind the ears." Some prefer the local abstraction of blood by means of scarification of the tonsils; but this is attended with considerable difficulty in children, timid persons, and where the cervical glands are swollen. It may be stated then, as a safe rule, that in a particular epidemic, or in some cases, bleeding may be required; but that in general the state of the circulation will not bear bleeding; so that the lancet must be employed with the greatest caution, and only upon urgent occasions.

Emetics have been recommended by the best writers on this subject. Dr. Withering employed them throughout the primary fever and eruptive stage, but it was particularly "at the very first attack, and when the throat was more affected; when the tumefaction of the fauces was such that the patients could not swallow, but with the utmost difficulty," that their good effects were most conspicuous. Dr. Willan also employed emetics, but did not find it necessary to repeat them so often as Dr. Withering advises. Dr. Burns, who had large experience in the school at Ackworth, gave an emetic in almost every case. They are, perhaps, best employed at the beginning of the attack, when the tongue is coated; when there is nausea and irritability of stomach; when the tonsils are much swollen, and after local depletion. They are observed to be more efficacious in children than adults.

In the last century there appears to have been as much difference of opinion on the propriety of employing purgatives as of the lancet. Dr. Willan says, "Purgatives have nearly the same debilitating effects as bloodletting; they are indeed very seldom necessary. Nevertheless, he thinks the occasional stimulus of a small dose, as two or three grains of calomel, very useful." Since the Profession has tested the importance and practical value of the observations of Dr. Hamilton and Mr. Abernethy, there are few practitioners who do not employ purgatives in scarlatina, or any other fever, unless they are contraindicated. There is certainly no class of remedies which is entitled to more confidence than purgatives when administered with discretion in the early stages of scarlatina. Calomel, in combination with jalap or rhubarb, given at night, and a draught of infusion of roses with manna and sulphate of magnesia in the morning, will generally be sufficient. Should the mucous membrane of the bowels show signs of irritation by frequent stools of an unhealthy character, purgatives must be withheld, and alterative doses of Hyd. cum Cretâ with castor oil prescribed in their place. In such cases it may be necessary to apply a few leeches or a blister to the abdomen, and to restrict the patient to a spare farinaceous diet.

If the patient be much distressed by the excessive heat of skin during the continuance of the efflorescence, he will derive not only great comfort but advantage from the affusion of cold water over the body, as recommended by the late Dr. Currie (*Med. Rep.*), or by simply sponging the body with cold water. The former of these methods of allaying the excessive heat is a powerful remedy, either for good or evil; but in consequence of its having been inconsiderately employed and followed by fatal consequences, it has now fallen into comparative disuse. All physicians, who have employed the latter plan of allaying the distressing heat, are unanimous in their opinion of the good effects resulting from sponging with cold water, which not only abates

the heat, but diminishes the frequency of the pulse, allays the thirst, acts as a sedative, often inducing sleep and gentle perspiration.

Although no positive benefits are derived from the employment of gargles, still they are sometimes use" l in detaching viscid mucus, which adheres about the fauces, and in other cases they lubricate those parts when there is a deficiency of moisture. Should the effort of gargling fatigue or distress the patient, it may be omitted. The effervescing saline draught in such cases often refreshes and at the same time cleanses the fauces. Dr. Willan, and many practitioners since his time, have advocated the internal use of chlorine in scarlatina: of this remedy the saturated solution of chlorine, recently prepared according to the directions of the Dublin Pharmacopœia, which contains about twice its volume of chlorine, is the best preparation. A fluid drachm and a half, with eight ounces of distilled water and two drachms of syrup of .emons, may be taken in divided portions during the day. For children, ten or twelve drops every six or eight hours are a sufficient dose. Of this remedy we have no experience; and those who have employed it have not pointed out the particular circumstances when it may be given with most advantage.

When visceral inflammation ensues in the progress of scarlatina, vigorous measures should immediately be adopted, although great discrimination is required in judging how far the antiphlogistic treatment may safely be pursued.

When the fever has subsided and the cutaneous efflorescence disappeared, it is often necessary to allow a more nutritious diet, and to prescribe tonics. Of these, perhaps, the preparations of cinchona are the best; and they may be advantageously combined with mineral acids. Wine is seldom necessary in scarlatina anginosa, unless the disease be protracted, and the powers lowered by large collections of matter.

3. The *scarlatina maligna*, although it commences with local symptoms very similar to the preceding variety, quickly indicates its formidable nature by the sudden depression of the vital powers. If bloodletting from the arm be a remedy of doubtful propriety in the two former varieties, it is here hazardous in the extreme. At the very onset of the disease the condition of the throat, or fierce delirium, may require the application of a few leeches beneath the jaw, or the abstraction of a few ounces of blood by cupping from the back of the neck: but the local inflammation rapidly assumes a malignant form, and typhoid symptoms set in, so that these remedies must soon be exchanged for a stimulant plan of treatment. As the heat of skin is rarely excessive, and the rash very prone to disappear, the cold affusion is to be abstained from, and there is scarcely necessity for the cold sponging; even purgatives must be administered with great caution, and mercurials given only to the extent of regulating the biliary secretions.

Dr. Bateman was of opinion that, "on the whole, the practice of administering gentle emetics appeared to be beneficial in this variety, especially at the very onset of the disease." In this opinion Dr. Tweedie coincides, adding, "unless the powers be so feeble as to render the shock of an emetic hazardous, benefit is often derived from their employment." As the case progresses, the extreme debility increases; and the malignant character of the disease is so apparent, that all the efforts of the practitioner are directed to support the patient's strength by invigorating diet, wine, cordials, tonics, and mineral acids. Perhaps of all the tonics the quinine, in solution with diluted sulphuric acid, is the most desirable. The preparations of cinchona have long enjoyed great celebrity for their remedial effects in scarlatina The use of bark was particularly recommended by De Haen, Sauvages, Plenciz, Wall, Johnston, Huxham, Cullen, and Percival, some of whom even regarded it as a specific cure for scarlatina. Dr. Withering, on the other hand, was of opinion, that cinchona was often improperly administered in scarlatina. Dr. Willan says (*Op. cit.* p. 375.), "Although the bark may be in many cases useful, it often disappoints our expectations; and when the disease has been improperly managed in the beginning, it is wholly inefficacious."

When the sulphate of quinine is employed in scarlatina maligna it should be given in full doses, at intervals of four or six hours; and if it does not disturb the stomach, may be persevered in as long as the typhoid symptoms continue. Where the quinine disagrees, or there is great aversion to its flavour, port wine diluted with water, or sago, or beef-tea, may be substituted in small quantities at frequent intervals, with nearly equal good effects. If the pulse continue frequent and feeble, the presence of delirium should not prevent the exhibition of tonics and stimulants. The carbonate of ammonia, once highly extolled as a remedy in scarlatina, is often prescribed by practitioners of the present day. Various gargles have been recommended by different authors, and are more useful than in those forms in which there is great internal swelling. Bitter infusions, as of cinchona, cusparia, or contrayerva, or infusion of roses acidulated with the diluted sulphuric or hydrochloric acids, are those most frequently employed; an infusion of capsicum is sometimes useful.

When local inflammations arise in the course of scarlatina maligna, general bleeding is rarely admissible; the practitioner must rely upon the topical abstraction of blood by cupping or by the application of leeches. Blisters have been much employed with the view of relieving the destructive inflammation of the throat, but their effects are questionable. Willan says, they are seldom useful, and sometimes prove injurious. As a general rule blisters are better omitted, though they may be useful in particular cases.

The treatment of the anasarca which ensues after scarlatina, is next to be considered. It might be expected that these serous effusions, which are often the symptoms of constitutional weakness, and which follow a disease characterised by great depression of strength, would require a stimulating plan of treatment to remove them. Experience and examination of fatal cases have proved, that these dropsies ought to be treated by antiphlogistic remedies. If these cases are treated judiciously before the amount of serous effusion is considerable, they are speedily relieved. In all the instances which have fallen under our notice, there has been manifest excitement of the system, indicated by increased frequency and hardness of the pulse. In many where the state of the pulse did not require immediate abstraction of blood, repeated doses of calomel followed by some purgative, which excites copious secretions from the intestines, have entirely carried off the dropsical effusion. In others the activity of the circulation, the hardness of the pulse, the heat of skin, oppression of breathing, and scanty urine, have suggested the necessity of blood-letting, followed by the administration of purgatives and diuretics. When there is suspicion of the dropsy depending on renal disease, it is prudent, in addition to the other measures, to abstract blood by cupping the loins. Of all the diuretics we prefer the combinations of potash with vegetable acids, and with these digitalis may often be combined with advantage. In children the bitartrate of potash, made into a confection with syrup and a few grains of ginger, is a useful remedy in doses of ʒss to ʒj. In some instances where the dropsy comes on in debilitated constitutions, or in scrofulous habits, blood-letting may be dispensed with; and indeed it may be necessary to combine some tonic with the purgatives or diuretics. In children the Ferri Potassio Tartras may be added to the cream of tartar confection with advantage. To the general employment of tonics in this affection, on the supposition that the dropsy depends upon debility, we must strongly object, inasmuch as it is contrary to our own experience, and that of the best practical physicians of the present day. When the effusions are removed, and all farther danger of inflammation of the serous membranes is over, small doses of quinine or salicine, which is said by Dr. Williams to be an excellent tonic and diuretic, may be given three times a day. These remedies, with a nutritious diet, attention to the bowels, and a change of air from town to the open country or seaside, are the best means of removing all the consequences of scarlatina, and of invigorating the general health.

Preventive treatment. There is no precaution that will prevent the spread of

the miasmata from the sick person, and consequently the infection of children and other persons if they remain exposed to the disease. The facts which demonstrate the distance to which the miasmata extend around the patient's person and communicate the disease, are still wanting; many recorded statements show, that when this disease has once appeared in schools, or other establishments for children, no precautions have been sufficient to control the spread of the infection. It is proper however to notice the supposed powers of belladonna in preventing the spread of scarlatina. Hahnemann of Leipsic, who was the first to advance this doctrine in 1807, observed that belladonna, given in small repeated doses, produced heat and dryness of the throat, swelling of the submaxillary glands, and a cutaneous efflorescence or erythema. He thence inferred, that this medicine, from its producing symptoms analogous to those of scarlatina, might prove a preventive against its infection. Observations on this interesting prophylactic measure have subsequently been made by Dr. Berndt of Castrin, by Dr. Dusterberg of Warberg, Dr. Bekr of Bernberg, by Professor Koreff, Hufeland, and Keinzman of Berlin, and they all give testimony, more or less strong, as to the efficacy of this narcotic employed for the purposes suggested by Hahnemann. The quantity administered is very minute. Three grains of the extract of belladonna are to be dissolved in f℥j of distilled water: of this solution three drops are to be given twice a day to a child under twelve months old, and one drop more for every year above that age. In general no sensible effects are produced by these doses, but in some instances it brings out an eruption similar to scarlatina. As we have never employed belladonna as a prophylactic against scarlatina, we can offer no opinion as to its value; but we have seen pain and redness of the fauces, with an efflorescence on the skin of the throat, follow the administration of a sixth of a grain three times a day. This subject is certainly worthy of the careful examination of those practitioners who have the charge of establishments for children, where scarlatina has made its appearance. It would not induce the prudent practitioner to relax in other preventive measures, such as complete insulation of the affected, ventilation, cleanliness, &c.; but as such measures have hitherto generally failed in the desired object, there can be no objection to making an experiment which, as far as we at present know, is perfectly harmless. More minute details on this subject may be found in *Cyc. of Prac. Med.*, art. SCARLATINA; *Arch. Gén. de Méd.*, Juin, 1824; Hufeland's *Journ. du Prac. Heilkunde*, Nov. 1825; Rust, *Magazin für die gesammte Heilkunde*, v. xxii. 1. 182.

PUERPERAL FEVERS.

Cursory remarks on the various opinions of the natvre of puerperal fevers. — Acute puerperal peritonitis. — Symptoms, anatomical characters, and treatment. — Adynamic or malignant puerperal fever. — Symptoms. — Anatomical characters. — Treatment. — Puerperal intestinal irritation and its treatment. — False peritonitis and its treatment. — Milk fever and its management.

ON perusing the numerous treatises that have been published within the last half century on this highly important class of diseases, the reader must necessarily be struck with the very extraordinary difference of opinion amongst the several writers as to the history and nature of the disease, the symptoms, mode of treatment, and the result of the practice adopted. The only point on which all seem to be agreed is, its great and striking fatality, and that it is one of the most serious, intractable, and destructive maladies to which puerperal women are liable.

What is of practical importance in these different histories may be easily reconciled, without attributing to any of these authors erroneous statements or wilful perversion. They have each described what they saw, fairly and completely, and the same difference of opinion as to the nature of the disease exists to the present day. The confusion has arisen chiefly from considering that every form of fever to which puerperal women are liable is necessarily the same, the truth being, that they vary in their nature and treatment as much as other kinds of fevers. With this precautionary consideration, there can be no reasonable objection to the term "*puerperal fevers*," which has so often been cavilled at and attempted to be reformed. All the other names which have been substituted are liable to objection, as assuming some particular structure to be invariably attacked with disease, whereas the local affection is by no means uniform; and hence the term "puerperal peritonitis," "peritoneal fever," "inflammation of the uterus and its appendages in puerperal women," will be apt to mislead. The name, "*puerperal fevers*," compromises no opinion; it does not necessarily imply the existence of idiopathic puerperal fever, a doctrine now so much disputed; and whatever may be our own view of the subject, we beg distinctly to state, that in selecting this name we only wish to use one most easily understood and generally recognised.

From our own researches into the writings of others, and from personal experience, both in private practice and as attached for nearly eighteen years to a very large lying-in hospital, we are inclined to doubt the propriety of considering puerperal fever as merely symptomatic of *local inflammation*. But if this were admitted, we have records of so great a variety in the seat of the inflammatory action, as proved upon dissection, that it will be found impossible to select any one part as peculiarly affected. We find in other fevers a liability to particular local lesions, equally varying: the brain, the chest, the mucous membrane of the stomach and bowels, have been, in different epidemics, the seats of the disorganising process; but it has been too much the fashion to put down all the morbid appearances as exclusively the cause, and not the result, of the constitutional affection. In considering puerperal fevers it has long been our conviction, that what has been called by Sydenham *the constitution of the year*, has been too much lost sight of. The great difference in the accounts of puerperal fevers by different writers is thus easily explained:— They have seen and described epidemics differing in their type, their local accompaniments, and in their power of being influenced by remedies, and hence honestly stating exactly what they saw, we have an explanation of what would otherwise appear contradictory. That the fevers of puerperal women are much influenced by the character of the other fevers of the season, was strikingly exemplified in the Westminster Lying-in Hospital during the spring of 1838, when some of the fatal cases were attended by petechial eruptions precisely similar to the *spotted* fever which was so prevalent at that time in the London hospitals.

In the spring of 1822 puerperal fever existed in the Lying-in Hospital in two very different and well-marked forms, at an interval of about six weeks between the last case of the first epidemic and the first case of the second. The early cases were of an active inflammatory character; the peritoneal covering of the uterus and intestines was chiefly affected; the albuminous and serous effusions in the fatal cases showed a sthenic state of the system, that is, the serum was clear, the coagulable lymph firm and white; the patients bore bloodletting and other active treatment to a great extent fairly, and with much advantage; the blood drawn was strongly cupped and highly buffed, and the fatal cases were few. Six weeks afterwards a very different epidemic was found to exist. The same remedies which had been so beneficial a few weeks before were naturally at first tried, but their bad success confirmed the sagacious remark of Gooch, that "the effects of remedies form not only an essential but the most important part of the history." (Gooch, *on Peritoneal Fevers*, p. 35.) The fever was attended with marked oppression and debility; the local pain

was comparatively slight; the pulse was extremely rapid from the first, with no force, and easily compressible; in many of the cases purulent deposits took place in the joints and in the calves of the legs, and in one case there was destructive inflammation of the eye. On dissection, a quantity of fetid, dark, turbid serum, with loose and soft shreds of dirty lymph, was found in the peritoneal cavity, with a large collection of highly offensive gas. In some the substance of the uterus and ovaries was infiltrated with pus, especially in those cases where there had been purulent deposits in the limbs. It was shortly after these cases occurred, that attention was directed by Dr. Marshall Hall to some similar cases of purulent deposit and destruction of the eye after parturition (*Med. Chir. Tran.s*, vol. xiii. part 1.), and which were the first series of cases published in this country of that nature, although some isolated cases had been previously noticed, which had been looked on as accidental complications. In these two epidemics, so striking a variety of character could not fail to attract attention, and we shall shortly have occasion to notice others; and yet Dr. Armstrong quotes with approbation the following sentence from Dr. Hulme:—"The operations of nature upon the human frame in this disease are the same in Britain as in Greece, and continue the same at this day as they were above two thousand years ago. This is likewise a clear proof of the IMMUTABILITY of puerperal fever." (*Armstrong*, p. 63.) In our opinion the puerperal fevers vary, as other fevers do, according to the season, local symptoms, the effects of remedies, and in the organs affected. We shall not trace the history of the numerous epidemics which have been recorded; but referring those who are desirous of acquiring such information to the more extended publications on puerperal fever, proceed to give a plain and practical account of those forms of the disease which are met with in hospitals and private practice, cautioning young practitioners to reflect, that as these epidemics have already so much varied, new varieties may again be found; and that it is advisable, especially for those who have the charge of lying-in hospitals, to watch closely and anxiously the first cases of the season, both as to the symptoms and as to the effects of remedies, before deciding on the character of the disease. A minute and searching investigation into the morbid appearances of the fatal cases is no less necessary, for there is fair reason to suppose, since the publication of the cases of inflammation of the veins, absorbents, and muscular structure of the uterus, by Dr. Robert Lee and others, that formerly those peculiar affections may have existed and yet escaped observation. It is to Dr. Robert Lee that the profession in this country is principally indebted for a much more extensive and complete investigation into the morbid changes produced in the course of this disease. But though agreeing with him to a certain point, and not doubting that in many, perhaps most, of the cases formerly known as the low or malignant form of puerperal fever, the fatal symptoms have arisen from disorganising inflammation of the deeper seated tissues of the uterus or its appendages or from phlebitis, these changes having been overlooked in dissection; yet Dr. Lee has in our judgment made a material omission, and one very common at the present day, in passing over the influence of the nervous system in these cases: the vascular system is held to be all in all, every thing is inflammation, and the powerful effect of altered nervous energy in the production of disease is lost sight of. Even the congestive form of fever, as described by Dr. Armstrong, and which every one of any extended experience must recognise, is but slightly alluded to, and, as it appears to us, is not cordially allowed to exist. In Gooch's treatise on peritoneal fevers already quoted, several cases are recorded in which death ensued after certain symptoms, and in which no morbid appearances were discovered on dissection. Dr. Lee would reply to this, that the examination was not pushed far enough, and that a more close inspection must have discovered some of the changes he has described. But after Dr. Lee's researches into these subjects were known, several cases similar to those related by Gooch, occurring in our own practice and in that of others, convinced us that

in these something might therefore be found: the most careful search was made for morbid alterations of structure in the veins, the absorbents, the muscular structure, and the lining membrane of the uterus and of the adjacent parts, and nothing could be found to explain the cause of death. What Dr. Marshall Hall has denominated "*the shock*" on the nervous system, has been much overlooked, which, whilst in itself now and then the immediate cause of death, is much more frequently followed by great depression of the nervous system, and ultimately by disease of a more protracted and generally fatal character. This condition is familiar to surgeons after severe injuries from accident or after operations, and it is well-known that patients in the crowded wards of hospitals, or such as have previously led dissipated lives, are much the most seriously and rapidly affected.

One of the most interesting portions of Dr. Ferguson's recent work (*On Puerperal Fever*) is that detailing his own views of the cause of puerperal fever. By a series of arguments ingeniously arranged and cleverly narrated, he endeavours to establish the following propositions: — 1. The phenomena of puerperal fever originate in a vitiation of the fluids. 2. The causes which are capable of vitiating the fluids, are particularly rife after child-birth. 3. The various forms of puerperal fever depend on this one cause, and may be readily deduced from it. He proceeds to show, by enumerating various experiments, that the introduction of pus, putrid matter, and other vitiated substances into the veins, produces lesions of various organs, more or less similar to those found in the fatal cases of puerperal fever, and a train of symptoms closely analogous. He then points out the condition of the uterus after delivery, and the separation of the placenta; the bruised condition of the pelvic cavity; the abraded state of the mucous membrane of the uterus, where the placenta was attached; the gaping orifices of the veins and sinuses; the offensive lochial discharges; and the injurious effects of mechanical injury, retention of coagula, or of portions of placenta, or of dead and putrid children. All or any of these conditions he considers as ready sources from which vitiated matters can be absorbed into the circulation. So far we think he has most ingeniously proved his positions.

All the difficulties however, in our opinion, are not yet removed. Dr. Ferguson takes pains to combat the opinion of Ritgen, that puerperal fever arises from something like a metastasis of the blood destined for lactification from the mammæ to the peritoneum and uterus, by noticing that the condition exists in all women at a certain time after delivery, whereas only a few are attacked with puerperal fever (*loc. cit.*, p. 100.). The same argument, however, weakens his own propositions; for it must be acknowledged, that numbers of cases occur, where there have been retained coagula or portions of placenta in a putrid state, or dead and decomposed children, or injuries from the use of instruments, and yet such patients have recovered without any untoward symptoms. These are the extraordinary events; but the existence of offensive lochial discharges, and of the alterations in the mucous surface of the uterus, are to be found in all cases of ordinary parturition. We can also state from our own experience, that the most serious and fatal forms of puerperal fever are generally those cases where the symptoms begin the earliest after parturition, sometimes in a few hours, and before pus could have been formed, or decomposition have taken place. It is a well-known and curious fact, that the severe symptoms which often follow wounds from dissection, by no means seem to have their intensity proportioned to the degree of putrefaction of the matter inoculated, but often the absorption from the freshest bodies is the most pernicious in its effects. Duhamel has related an instance, in which an innkeeper and a butcher died from receiving accidental wounds in slaughtering an ox which had been over driven; and the blood from the same animal produced gangrenous inflammation on the hand and cheek of two women who were sprinkled with it. During the progress of puerperal fever, in the same patient we often find, in the first instance, active inflammation with

highly fibrinised blood; in its course, as typhoid symptoms appear, the condition of the blood is completely changed, while subsequently, in convalescence, its natural character becomes gradually restored. Dr. Tweedie, in his able article on fever (*Cyc. Prac. Med.*), has cited cases by Drs. Stevens and Potter, in which, during an epidemic fever, the blood drawn from healthy persons in the infected localities was found to possess the same morbid character with that drawn from those actually sick, "and could not be distinguished from the blood of those who laboured under the most intense forms of the disease," while blood drawn at the same season from persons living in the surrounding healthy districts was totally different. The paper of Mr. Gulliver (*Trans. Roy. Soc.*) has been quoted by Dr. Ferguson in confirmation of his views, but with doubtful advantage. There is a wide distinction between the defibrinated blood in typhus and other malignant fevers, and the mere presence of pus in the circulating fluid. Mr. Gulliver found pus in the veins in one case of puerperal fever only; but he found it also in cases of confluent small-pox, swelled leg from ulcer, superficial wound of the tibia, erysipelas, suppuration of the integuments of the thigh, and in tubercular phthisis. In the latter class of diseases, as well as in lumbar or other extensive abscesses, the existence of pus in the veins has been long known, and has been supposed to be the cause of the hectic fever accompanying such diseases. But where it can exist with such very different symptoms, from such a diversity of causes, and under such a variety of circumstances, it is assuming too much when it is stated to be the cause of puerperal fever. In the experiments upon animals referred to by Dr. Ferguson, allowance ought to be made for the sudden, and what may be called violent, mode in which the offending matter has been introduced into the circulation, and so different from what takes place in spontaneous absorption. It must not be forgotten, that the most innocent substances, when thus injected into the veins, cause death rapidly, and with as much disturbance as the putrilage and fetid pus used in Cruveilhier's and Gaspard's experiments. In Magendie's *Lectures on the Blood*, this fact is proved distinctly, and very much alters the force of Dr. Ferguson's arguments. Neither were the effects of the injection of pus, or of putrid blood, or of beef gravy, by any means uniform, either in degree, in the extent of injury, or in the organs injured. It is remarkable, that in Gaspard's eighth experiment, where mercury was injected, the lesions so often found in puerperal fever were more especially produced in the sheep operated upon.

Dr. Ferguson believes that the vitiation of the fluids is the essential cause of puerperal fever, and that the condition of the atmosphere, and the sthenic or asthenic state of the patient, only modify the type of the fever, as much as those circumstances are known to modify small-pox or measles. Time and more extended observation will test the value of this theory; but we are by no means disposed to lose sight of the influence of some preliminary effect on the nervous system, some previous step by which these changes in the condition of the blood take place. In the cold stage of cholera, in the onset of yellow fever, in ordinary typhus of the malignant type, where there has been no source from which either purulent or putrid matters could be absorbed, we find a remarkable condition of the blood, its cohesive property appearing to be changed, and even destroyed. Magendie's researches and experiments tend to prove that the most striking effects from the injection of pus, serum, or other matters into the veins, are shown in the first instance by destroying the coagulability of the blood, and altering its colour. He also states, that healthy pus rarely produces this effect, although serum, or pus mixed with serum, do so at once. To this want of cohesion in its particles, and alteration in quality, Magendie attributes the lesions of the important organs through which it is distributed, and the serous infiltrations that subsequently take place. These same conditions are produced in those formidable fevers and other diseases, in which one of the earliest and most striking changes is in the character of the blood, and yet without the possibility, in the first instance, of

the absorption of pus, serum, or any other vitiated matter into the system. The miasmata from foul sources, whether vegetable, animal, marshy, or atmospheric, are supposed to be the exciting causes in these diseases, and, as shown by the symptoms, acting primarily on the nervous system. That the nervous system is the main instrument by which this change in the blood takes place, is partly proved by the fact that electricity in a powerful form, and many of the animal and vegetable poisons which act solely on that system, produce the same phenomena, viz. blood divested of its coagulating or vital property. The effect of atmosphere, noxious exhalations, hospital atmosphere, and season, on the type of the prevailing puerperal fever, is distinctly proved; and we think the fair consideration of all these circumstances leads to the conclusion, that the vitiated state of the blood is the secondary and not the primary link in the chain of phenomena, and that it occurs in many instances in diseases of similar character to puerperal fever, where it could not arise from venous absorption. Andral has truly and sagaciously remarked, that no line of demarcation can properly be drawn between the blood and the solids, and that, physiologically speaking, it is impossible to conceive that one of these two parts of the same whole could be modified without the other being so likewise. There is no longer any meaning, he observes, in the disputes between the Solidists and the Humorists; the system appears to constitute but one great whole indivisible in the state of health, as well as in that of disease. The division is a distinction of small importance, and one that is not always just, since it ceases to exist in the intimate structure of the organs in which all the grand vital phenomena take place, and in which also occur all the changes that constitute the morbid state.

On a knowledge of the *predisposing causes* will depend much, if not all, that we can do, to guard the patient from this formidable malady. These are, principally, mental depression and agitation, exposure to cold, retention of coagula and portions of the placenta, mechanical injuries during parturition from manual or instrumental aid, crowded and ill-ventilated rooms, noxious exhalations, fatiguing attempts to suckle, &c. The question of propagation of puerperal fever by contagion is a most important one, and we could enumerate many striking facts proving its occasionally contagious nature. It does not seem to us at all to militate against this conclusion, that it very often is not contagious, because we find the same exemption in other universally acknowledged contagious diseases, common typhus, and scarlet fever, hooping-cough, small-pox, measles, &c. Few who have seen much of the disease will doubt its occasionally, at least, being conveyed through third persons, usually the medical practitioner or the nurse, and therefore it is our duty to take all reasonable precautions in visiting healthy parturient women upon leaving those who are labouring under the disease.

I. Acute Puerperal Peritonitis.

The simplest form of puerperal fever is that of peritonitis. On the second, third, or fourth day after delivery, in some instances much later, the patient is seized with a severe rigor, accompanied or speedily followed by acute pain in the abdomen, generally in the hypogastric region. The pain is constant, though there are often exacerbations at irregular intervals: it is increased by pressure; and the tenderness, which is speedily followed by fullness and tension, rapidly extends over the whole of the abdomen, often to the pit of the stomach. The patient lies on her back, the pain being aggravated by turning to the side: the extremities are generally slightly drawn up, to relax the abdominal muscles, and to avoid the pressure of the bed-clothes. The local symptoms are always accompanied with well-marked constitutional disturbance: the secretions, more especially the milk and the lochial discharges, are checked; the skin becomes hot, the pulse rapid, small, and wiry, or sometimes full and bounding. The tongue is sometimes creamy and moist, often dry in the

centre with a dirty coat; now and then it is scarcely affected. There is sometimes, but not constantly, great pain of the head with throbbing of the temples, want of sleep and restlessness, with occasional vomiting. The countenance is anxious, often suffused. The respiration is hurried, whilst the slightest disturbance or bodily exertion increases the abdominal pain. If the proper remedies be promptly employed, and the disease yield to them, the pain gradually abates, the tenderness not so soon, the skin becomes moist, the pulse subsides, the milk and lochial discharge become more abundant, and the patient begins to change her posture from the back to the side. All these are promising signs of recovery, and unless there should be a relapse, by no means an uncommon event, she is well again in two or three days. In other instances, however, the result is different. The pain and tension of the abdomen increase, and often sudden or nearly sudden subsidence of the pain after some hours takes place; the abdomen feels hard and tympanitic; the pulse becomes more and more rapid, as well as feeble and thready; the skin clammy and cold; there is occasional confusion of ideas, which is soon followed by low muttering delirium; the tongue becomes dry and brown, the teeth covered with sordes; the patient is distressed with eructation or with vomiting, sometimes of dark or green matter; hiccough, twitching of the limbs, sunk and cadaverous countenance, and cold extremities, are the sure indications of approaching death. Though this is the common course of the disease when fatal, the symptoms do not always assume this exact form, but what is termed a latent character. There is often no confusion of intellect to the last; the situation of the pain varies, or it may be entirely absent. Some years ago we assisted at the examination of a patient in the British Lying-in Hospital, who had constant sickness but no abdominal pain, except at the pit of the stomach, and no tenderness on pressure, and yet the appearances proved that extensive and violent peritoneal inflammation had existed.

On dissection of cases of acute puerperal peritonitis the following appearances are found:—The peritoneum preternaturally and uniformly red and often thickened; sometimes it is here and there pale, with effusion of serum into the abdominal cavity mixed with flakes of coagulable lymph. The intestines are distended with flatus, and matted together by patches of coagulable lymph. These appearances are more or less diffused over the fundus of the uterus, on the reflexions of the peritoneum, upon the uterine appendages, on the omentum, the liver, and other viscera, and not unfrequently over the peritoneal covering of the diaphragm. The ovaries, the uterus, and the Fallopian tubes are often coated with a creamy fluid, and sometimes purulent deposits are found in the muscular structure of the uterus and in the ovaries, the natural structure of the latter being often completely disorganised and converted into sacs of purulent matter.

This form of puerperal fever is often epidemic; it is that which has been described by Dr. Gordon, Dr. Armstrong, Mr. Hey, and others; and although much more fatal when epidemic than when in a sporadic form, is, when taken in time, most under the control of remedies. It now and then creeps on more insidiously, is not preceded by any distinct rigor, the pains of the abdomen are more intermitting and are mistaken for after-pains, but the pulse always becomes suspiciously rapid, and, whenever this is the case, immediate alarm should be taken.

The *treatment*, to be successful, must be early and prompt; every hour of delay after the onset of the symptoms is of the utmost importance. The medical attendant is rarely summoned until the rigor has ceased, and the pyrexia is established. If the patient is seen sufficiently early during the rigor, hot diluents and perhaps an emetic should be given, and hot fomentations or poultices should be freely applied over the abdomen. A full dose of calomel with James's powder and opium may be administered, and in a couple of hours a purgative of castor oil, salts and senna, or jalap. Warm water injections may be thrown up the rectum, and also the vagina. We have often

found these remedies, when used at once, sufficient to arrest the disease. In 1822, when the writer was house-surgeon at the Lying-in Hospital, where an epidemic puerperal peritonitis was very prevalent both among the in and out patients, several cases were arrested, apparently *in limine* by this treatment. If, however, we find the pulse increasing, and the symptoms not alleviated; or if, as is most likely, we do not see the patient till after the rigor has subsided, and the disease is established, it will be necessary to bleed. Should the patient be feeble and delicate, and the symptoms not severe, or the pulse much accelerated, we may perhaps be satisfied with the application of leeches to the abdomen; but they are in general much better kept in reserve for future purposes: we must regulate the mode of abstracting blood, as well as the quantity, by the strength of the patient and the effect produced. The object being in nearly all cases to produce the greatest possible effect with the least loss of power, the best plan is to bleed in the erect posture and from a large orifice. The quantity taken must of course depend upon circumstances: we have been most satisfied when decided faintness has been produced; if however, upon recovery from deliquium, the pulse be still hard and quick, and the pain not decidedly relieved, it will be prudent to continue the flow of blood till those objects have been attained. The patient should be visited within six hours, and if there be recurrence of the pain, and if the pulse again become hard and quick, more blood must be taken. This second bleeding may perhaps be followed by a third according to circumstances; but symptoms of debility are apt so soon to show themselves, that subsequent bleedings are often better when only local, by means of leeches, the number being applied proportionate to the degree of pain and tenderness. The pulse is the best guide, for the pain after the first full relief from the bleeding is often of a mixed character, partly inflammatory and partly nervous—to be detected only by watching closely the other symptoms. The tenderness is a less certain guide, for few will bear pressure for a considerable time after the inflammatory symptoms have been entirely relieved. Many patients also from fear shrink from the pressure of the hand, although, by drawing off the attention, it will be found that they bear firm and steady pressure very well. As a most valuable adjunct to the abstraction of blood, mercury must be freely given. In the cases now under consideration, after having tried almost every form and every dose, we give the preference to calomel, in moderate doses at short intervals. After the bowels have been freely emptied, we generally order five grains of calomel every two, three, or four hours, according to circumstances: it is decidedly more efficacious when combined with Dover's powder, or with James's powder and opium. Many object to opium in these cases—that it masks the disease; but when thus combined, we deem it to have a material influence in allaying the symptoms, and preventing the confusion often arising from the mixed nervous inflammatory or even spasmodic pain, which for the first two or three days after labour is so apt to exist. Hot poultices or fomentations to the abdomen are to be frequently applied—a hot light linseed meal poultice is on the whole most convenient and most easily borne, and should be changed as often as it gets cool. In the majority of cases, if no marked relief has been obtained before, the symptoms yield when the mercury begins to affect the mouth, the signs of recovery mentioned before taking place. In less favourable cases, when, in spite of remedies, the disease advances, much good may be gained by the application of hot turpentine to the surface of the abdomen, or a large blister may be applied, and the sore dressed with mercurial ointment. We have witnessed in some cases the most striking advantage from this remedy, even when every sign of effusion had taken place. When there is great distension of the abdomen, with eructations, sickness, and the pulse varying from 130 to 160, remission of the pain, and a clammy cold skin, even then we need not despair. Nourishment and stimulants, wine, brandy, and ammonia, should be freely administered. In such cases the internal exhibition of the turpentine has now and then succeeded, though no practitioner who has made

trial of this remedy has found it so successful as Dr. Brenan of Dublin has stated it to have been in his own practice. But as a forlorn hope, after effusion had taken place, we have known it often tried, and in two cases with success. In some others the effect of the first dose was so decisive in carrying off flatulence, and allaying the tympanitic swelling, that we have been much disappointed to find the rapid return of all the mischief. Dr. Joseph Clarke found it equally tantalising, and very difficult to get the patients to continue the doses after the first had produced relief. (See his letter in *Appendix*, No. ii. cited by Armstrong.) In the progress of the alarming symptoms of collapse, the only hope is in the constant watchfulness of the attendant; and as we have known a few cases recover when every thing seemed desperate, we feel inclined to urge the most devoted application of all the usual restoratives to the last. Some years ago we left a patient at the Lying-in Hospital so far gone, that it was predicted she could not live through the night; she was alive and improved the next morning; the house-surgeon had never left her, had supplied her with brandy and egg at short intervals by teaspoonfuls, and in a fortnight she left the hospital quite convalescent. Such is the treatment we should recommend in this form of puerperal fever. The minute details must depend on the circumstances of each case. It is impossible to do more for the young practitioner than to give him the outline, and it is only by his personal experience that he can gain the art of weighing the comparative importance of symptoms, and the most ready means of meeting them.

II. The Adynamic, or Malignant Puerperal Fever.

There is another form of puerperal fever, however, of a much more dangerous and fatal description. The symptoms differ in some respects from the acute peritoneal inflammation just described, and in many of the cases the morbid appearances found upon dissection are essentially different. It would be satisfactory if we could always trace the connexion between the peculiarity of the symptoms and the morbid changes, as it would simplify our knowledge of the subject, and in time improve the treatment. Dr. Robert Lee has attempted this, but we are obliged to confess that our experience by no means confirms the accuracy of his descriptions. In the low or malignant forms of puerperal fever, we have certainly met with the appearances on dissection which he has well described, but have often met with the same character of symptoms equally fatal in their course, but have not been able to discover the morbid appearances in the structure of the uterus or its appendages mentioned by him and by some French and German writers. In the epidemics which prevailed in the Dublin Lying-in Hospital, during the time that Dr. Collins was master (from 1825 to 1829), which were very fatal, though many of the cases were of this malignant character, and typhus fever with petechial eruptions was prevalent at the same time in the city, in by far the majority of the cases the deeper seated structures were but little affected. The symptoms of this form of the disease are, to a certain extent, similar to those of acute puerperal peritonitis; there is often a rigor, but by no means always well-marked; the pain in the abdomen is less severe, and in some cases more circumscribed, and often limited to the hypogastrium or to the right or left iliac region, often both sides being affected. There is less tenderness on pressure, and the pain in some instances appears deeper seated. In these cases it would be very satisfactory if we could trace a connexion between the symptoms and the morbid appearances; for instance, where the seat of pain and tenderness is in the right or left groin, that the ovaries, broad ligaments, and Fallopian tubes are, in the first instance at least, the seat of inflammatory action; and where the hypogastrium is principally attacked with deep-seated pain and tenderness, that the uterine structure is affected. The appearances found in two fatal cases which occurred in the General Lying-in Hospital in the early part of 1838 will prove the fallacy of this conclusion. In the first the symptoms came on the third day after delivery,

and the patient survived three days only. On dissection the following were the appearances, — general peritoneal inflammation; disorganisation of both ovaries, particularly the left; and a collection of purulent matter in the folds of the broad ligament near its connexion with the uterus. In this case the patient had no pain in any part of the abdomen, even on deep pressure. In another case the symptoms were well-marked on the second day after delivery, and proved fatal within twenty-four hours. The morbid appearances noted after death were, slight effusion, not more than an ounce and a half of fluid in the abdominal cavity, complete disorganisation of the ovaries, with sloughing of the lining membrane of the uterus. In this case there was pain and tenderness of the abdomen principally referred to the *umbilical* region. Such contradictory symptoms are so common, that they cannot be fairly classed under the head of anomalies, and seem to justify the conclusion that, in the present state of our knowledge, we are not entitled to consider the changes of structure found after death as conclusively indicated by the previous character and situation of the pain.

The most formidable *symptoms* of this form of puerperal fever are to be found in the pulse, the countenance, and the nervous system. In all of these cases the pulse is, at a very early period, extremely small, rapid, and compressible, varying from 130 to 160; the countenance is remarkably anxious and sunk, with a livid, often a yellow tinge of the skin; there is much more restlessness and tossing than in the more active inflammatory fever, nor does alteration of the posture appear to increase the pain as much as might be expected. The muscular powers, however, are extremely prostrate; there is great mental depression, and though the intellect often remains clear to the last, in the majority of the cases there is low muttering delirium; the tongue is coated, at first with a white, and soon with a dirty and yellow fur, which soon becomes dry and brown, though often in hospitals, during epidemics, the disease runs its course so rapidly that there is not time for this last change in the appearance of the tongue. Dr. Gooch's remark as to the effects of remedies becomes here a valuable guide. Where blood is taken from the arm, a very small quantity produces faintness, and the blood is usually dark, the coagulum formed is loose and easily broken down, and the serum is separated slowly and imperfectly. After even a very small bleeding, the patient's prostration of strength is frightful, and the urgency of the symptoms is increased. Diarrhœa is a very common attendant, the evacuations being often highly offensive, and the patient is often distressed with eructation and vomiting. The lochial discharges are fetid, but by no means always suppressed. The abdomen is very early tympanitic, but firm steady pressure more frequently relieves than aggravates the pain. The breasts speedily become flaccid from subsidence of the milk: there is an eagerness for cold drinks, or, on the other hand, for brandy or porter; but now and then an indifference to all sustenance, and a dislike to be disturbed. The stage of collapse soon succeeds, and the symptoms often run their course, during hospital epidemics, with such astounding rapidity, that death may take place in a very few hours. We have long remarked, that whenever the disease begins very shortly after delivery, within the first twelve or eighteen hours for instance, the more intense and rapid is its progress, and the result more constantly fatal.

The *anatomical characters* vary in this as they do in the more active forms of puerperal fevers. Most commonly, in our experience, in the peritoneum, throughout its whole extent, the principal morbid appearances are to be found. There is a large quantity of fetid gas in the intestines and abdominal cavity. The peritoneum has a dusky hue, very unlike the bright florid appearance of the acute peritonitis. The effused fluid has a dirty, brown, often bloody appearance, and is peculiarly glutinous (mentioned also by Dr. Collins). The shreds of lymph, when there are any, are loose and destitute of firmness. In many, perhaps in the majority, of these cases, the morbid changes are thus limited, and by the most careful search, none of the other textures exhibit any

morbid alteration. But as in the more active inflammatory disease lesions of other organs are often discovered, more especially the uterus and ovaries, the structure of which is broken down and pulpy, that of the uterus often approaching to gangrene. In 1829, in the Maternité at Paris, of 222 fatal cases forty-nine exhibited this ramollissement of the uterus. In many of the worst cases in the General Lying-in Hospital, a sphacelated condition of the lining membrane of the uterus was found; and in Waldron, in the year 1836, the whole structure of the uterus was, to use the words of the house-surgeon who recorded the case, "*fairly rotten.*" In this instance, and in some others, there was a peculiar fetor from the whole of the abdomen for two days or more before death. It is to be regretted, that in by far the majority of the fatal cases in our lying-in hospital, the friends prevented post mortem examinations.

It would seem then, from the history of many of the cases, that although the same structures are attacked in both these forms of puerperal fever, and also although the nature of the affection is evidently inflammatory in both, the character or type of the inflammation is manifestly different. In what this difference consists appears to be the chief difficulty; and we are inclined to attribute the diversity in the character of puerperal epidemics to this difference, rather than to variety in the locality of the inflammation itself. We see very different forms of inflammatory action under other circumstances, and why not in this? We admit the scrofulous, the rheumatic, and the erysipelatous forms of inflammation to be as distinct as the dynamic and adynamic, and why may we not allow a difference in the nature of the local inflammation in puerperal fevers? The distinction appears to us to depend mainly on the energy, or want of energy, in the nervous system. In epidemics this difference is generally remarkably shown, and the great fatality of puerperal fevers in London lying-in hospitals is evidently much influenced by the previous moral and physical condition of the patients. A great number are half-starved before admission. In reading over the recorded cases of our lying-in hospital, one of the patients on her admission is said to have devoured her food in the most ravenous manner, having evidently been deprived of wholesome food for days before. A considerable number of the women are habitual dram-drinkers, and on losing their daily stimulus, rapidly fall into a state in which disease is excited from the most trifling causes, and becomes strikingly fatal. The late respected and intelligent matron was so convinced of this being frequently a cause of puerperal disease, that she administered with the best effects gin mixed with gruel to the poverty stricken unfortunates, when they began to show, a day or two after delivery, a peculiar prostrated look and manner with a trembling tongue, which her experience easily detected. In the spring of 1838, when puerperal fever was remarkably prevalent and more fatal than was ever before known in the lying-in hospital, it was discovered that there was an open sewer, 200 yards in length, immediately at the side of the building, which had become exceedingly foul and offensive. The hospital was closed for several weeks, but the first cases readmitted were attacked with fever, and there was no remedy but again to close the hospital and take measures to cleanse and inclose the sewer.* The suddenness and the fatality of the fever was precisely like that form of typhus fever which often arises from exposure to similar miasmata, the effect of which on the nervous system is well-known.†

The *treatment* of this form of malignant puerperal fever has been very unsatisfactory. Dr. Gordon, Mr. Hey, and Dr. Armstrong, the advocates for large bleedings in all cases, because they happened to see epidemics which would bear it and demanded it, have said that the fatality of the *low* puerperal fever of London must have arisen from timidity, and not pushing

* The hospital was reopened in the first week of November. From that time to the 1st of August, 1839, 142 cases were admitted: 7 or 8 cases of decided puerperal fever have occurred, and a few of abdominal pain and tenderness: all the cases recovered.

† In an early volume of the *Medical Gazette*, are recorded some striking cases of this description which occurred at Clapham, and were clearly traced to exposure to the putrid exhalations from the contents of a privy which had been emptied and discharged near the house.

bleeding to a sufficient extent; that however feeble and rapid the pulse, bleeding was the only remedy to be depended upon, and that the pulse would *rise* on the loss of blood. An *oppressed* pulse would certainly do so in many instances, but there is a certain and important difference between the oppressed and really feeble pulse, though many can with difficulty distinguish the one from the other. The earliest experience of the writer in puerperal fever was in two distinct and well-marked epidemics in the spring of 1822. From the decided advantage of copious bleeding in the first, we were naturally led to push what is commonly called bold practice in the first cases of the second, but the result soon proved our rash mistake. These adynamic cases will not bear bleeding favourably — a very few ounces will often produce fainting followed by rapid collapse. It should however be kept in mind, that in an epidemic of this description, cases of an opposite character occasionally occur. Women of robust constitutions, previous to the attack in comfortable circumstances, and accustomed to a generous diet, may have the active form of the disease, while dozens of patients are suffering under the other form in the same wards. We must be guided, then, by the condition of the patient, as well as by the character of the prevailing epidemic. Unless the pulse be exceedingly powerless, we may try the effect of bloodletting; should the patient quickly turn faint, the best way is to close the orifice and wait patiently till the blood has had time to show its condition. If marks of active inflammation are apparent, the vein may be again unclosed, and more blood taken; and generally after the first faintness has subsided, a much larger quantity will flow than might have been expected. The pulse must be closely watched, and the arm bound up, when its feebleness shows that sufficient blood has been drawn to affect the circulation. If we are unable to take blood from the arm, we may apply leeches to the seat of the pain, from one to four or five dozen, according to the degree and extent of the pain, as well as the strength of the patient; for some, it must be borne in mind, are even struck down by a few leeches. Where the pain is chiefly referred to the uterus, and particularly if that organ is felt swollen, hard, and tender, a few leeches applied to the os uteri and cervix, by means of a uterine leech-tube, will give greater relief, and with less loss of power than four times that number externally. Leeches thus applied are likely also to be most serviceable where the lochial discharge is stopped. Cataplasms to the abdomen, as long as there is no tension, are sufficient; they give relief, and also promote a warm perspiration. But if there is early tympanitis and much eructation, the application of a blister, or of hot turpentine, will be found more serviceable in relieving the pain and allaying the flatulence. Though often much disappointed in the effect of mercury in this form of puerperal fever, we do not know any remedy from which manifest good has been so frequently derived. Dr. Collins has remarked a great difficulty in affecting the mouth with mercury in these cases, which agrees with our experience. We have seen many cases recover where the mouth has not been affected, and several die where full mercurialisation had been established. But on the whole, when the constitution is shown to be under the mercurial action, the symptoms usually improve, the healthy action is slowly restored, and the pulse becomes steadier and quieter. Along with calomel, in doses of three to five grains every hour or two, we are in the habit of giving Dover's powder, or a combination of James's powder and opium, from half a grain to a grain of the latter. The larger doses of calomel have not been so successful in our practice as they appear to have been in that of others. We have given twenty-grain doses every four hours, but though in some it produced rapid salivation, and with advantage, in most of the cases it produced much distress, and failed to arrest the disease. Dr. Collins gave often upwards of 300 grains of calomel in the course of the treatment of a single case, and to another which recovered he administered 308 grains in twenty-four hours, and one patient took *an ounce*. He preferred three or four grains of ipecacuanha in combination with the calomel, which

rarely produced nausea after the first dose. To many of the patients he also gave opium freely, in combination with calomel. He also occasionally gave it uncombined; but opium alone is chiefly beneficial in another form of puerperal fever, which will be hereafter described. Where with the other symptoms there is distressing diarrhœa, we generally find the Hydrargyrus cum Cretâ, combined with opium and ipecacuanha, more useful than calomel. It may be given in ten-grain doses, with from three to five of the Dover's powder.

Although in the acute form of puerperal fever the patient is to be kept upon the thinnest farinaceous food, in this form nourishment and even stimulants are early required. It may at first sight appear contradictory to prescribe leeches and mercury at the same moment with strong broths, jellies, and even wine and cordials; but experience proves the value of the practice. In the low condition of the nervous system energy is wanted to produce healthy action, and without supporting the vital powers we find the patient sink much more readily under the influence of disease. This is a very important point in the treatment, and should always be kept in view. In the hospital we find the gin caudle, when prudently administered, a very valuable assistant in the treatment of the disease, although, as far as symptoms can prove it, inflammatory action exists, but then it is adynamic inflammation. Some of the distressing symptoms must be relieved by other remedies. Effervescing saline draughts, containing the bicarbonate of ammonia in camphor or mint julep, allay the sickness and eructations. Turpentine injections occasionally subdue the tension of the abdomen, but are inadmissible when there is troublesome diarrhœa. Injections of weak solutions of the chlorate of soda or lime, in warm gruel, into the vagina are useful, by correcting the fetid vaginal discharges should they exist. Dr. Collins has great confidence in the use of the warm bath; and though we have had no personal experience of it, we should be inclined to recommend it from his report. We have hitherto been deterred from the trial from the pain experienced on the least movement, and from the sensation of great exhaustion complained of; though when carefully managed, with ample and skilful assistance, this objection may be obviated; and it would be very likely to soothe the restlessness and promote free perspiration with an equal circulation.

There are often cases of a more protracted nature, which attain a certain approach to convalescence, but linger on for many days and eventually sink. There are others where the whole disease appears to be chronic or subacute, and such cases are often met with, where there are no other suspicious symptoms than a look of anxiety, great sense of exhaustion, and a rapid pulse. We remember a patient who, on the eighth day of these symptoms, having had an accidental injury, exclaimed it was quite a relief to feel pain. These cases are insidiously dangerous, and it is a safe rule always to be on the watch when the pulse keeps up above 100 for any number of days after parturition. In the majority of these cases, tympanitis or effusion into the peritoneal cavity comes on at last, and they run the usual course, although no very prominent symptoms have been previously noticed. In these, however, we find the same variety in the appearances on dissection that have been already noticed; in many the peritoneum alone shows signs of mischief; in others the uterus is principally affected; and again there are abscesses in the ovaries, the broad ligaments, and the Fallopian tubes. It is in the protracted cases, following more acute symptoms, that we have most frequently found the purulent deposits in the substance of the uterus, with or without the same occurrence in the joints or other parts of the body. In some of these instances there is no pain in the joints, or in the parts where the collection of pus takes place; but in many (as happened in the epidemic of 1822), there are phlegmonous appearances attended with acute pain. In those cases the calf of the leg and the elbow joint were uniformly affected, painful inflammation with hard tumefaction came on, and in a day or two an abscess formed. Many of these patients recovered, but the convalescence was exceedingly slow, and

several times fresh abscesses formed at a time when all appeared satisfactory. The remarkable destructive inflammation of the eye, which has been already mentioned, rare as it is, can hardly, perhaps, be placed as a symptom peculiar to this form of puerperal fever ; but we have witnessed four instances of it, and in each there were purulent deposits in various parts of the body. In the five cases related by Dr. Marshall Hall, which also occurred after delivery, the same fact was noticed ; there was the same rapid pulse with constitutional disturbance, lasting for many days before the inflammation of the eye was discovered. In Dr. Hall's cases the left eye was uniformly the one inflamed, and it is curious that such was the fact in the four which have come under our own knowledge. In only one of Dr. Hall's cases was any decided abdominal pain and tenderness noticed, whereas three out of the four of our cases had such symptoms. In none could any post mortem inspection be obtained. Dr. Robert Lee (*Cyc. Prac. Med.*, art. PUERPERAL FEVER) has alluded to two cases under his own care, where this destructive inflammation of the eye occurred in *both* eyes. He is inclined to believe, that this remarkable affection is the attendant upon the "morbid condition of the veins of the uterus," the purulent or other depraved secretions entering the system, and acting as a poison on the whole mass of blood. In Dr. Hall's cases and our own no examination took place to elucidate this theory, and Dr. Lee does not quote any dissections to confirm it.

It may appear presumptuous to recommend any course of treatment in a disease which, as far as we know, has always been fatal; but in one case which we witnessed, so much marked benefit was obtained by stimulants, a generous diet, bark, ammonia, and large doses of opium, though the patient relapsed by an accidental alteration of the plan, that in a similar case we should certainly be inclined to follow it: such a course has also been the most successful in the instances of purulent deposits, without the affection of the eye.

In the chronic forms of the puerperal affection we have noticed, without these additional symptoms, a large blister over the abdomen, dressed with mercurial ointment, has been occasionally beneficial. Among the varieties of plans that have been tried, the topical application of ice to the abdomen may be mentioned; and with this some have recommended the internal administration of ice and iced drinks. We witnessed, many years ago, some sporadic cases treated in the former manner, and they recovered; but the symptoms were by no means severe, and within the last year it was adopted in some of the cases in the Lying-in Hospital, but not with any satisfactory results. The iced drink was very grateful, and taken with avidity; and though we could not trace any bad effects decidedly to the remedy, yet certainly no permanent advantage resulted. When in the epidemic already alluded to, the symptoms were accompanied with petechial blotches, a fatal adynamic "spotted fever" was prevalent in many parts of this metropolis. In some of the hospitals such cases were treated with marked benefit on *the saline plan*, recommended by Dr. Stevens in the West Indian fever and in cholera. On this account the saline medicines were given to many of our puerperal fever patients, whether petechiæ were present or not; but the result was by no means encouraging.

The *congestive* form of puerperal fever (so termed by Dr. Armstrong) is in our opinion merely a highly aggravated form of the first stage of the ordinary disease.* When reaction is established, if that can be brought about, the same train of symptoms follows, and the same course is run. A patient may die before reaction takes place, as they may die in the cold fit of an ague, or of some of the virulent tropical fevers; but we do not believe there is any peculiarity in the type of the disease, except in the intensity of this first stage. Hot baths, diffusible stimulants, hot frictions, stimulating injections, and perhaps emetics, form our chief resources to bring on reaction ; and in some cases very cautious abstraction of blood may be employed, to relieve the right side

* "I have seen a few who never grew warm after the rigor, which then resembled a convulsion," (Denman's *Midwifery*, 6th ed. p. 434.)

of the heart, and promote a more free circulation. If the blood flows after the first few moments with freedom, and the pulse becomes more distinct, and the aspect of the patient improves, we may with confidence allow more blood to flow, but not enough to produce faintness. Where death has taken place in this congestive stage, as might be expected, the venous system is found gorged, and there are no traces of inflammatory action or effusion.

III. Puerperal Intestinal Irritation.

A far more common variety of puerperal fever if it can be so called, and one of great consequence to discriminate, is that arising from intestinal irritation. It is not in itself inflammatory, and it does not *necessarily* lead to inflammatory action of any sort, but it is very apt to be mistaken, and to terminate fatally, and in a great measure from the bad adaptation of treatment. Besides this, it is a very frequent cause of the other varieties of puerperal fever, and intestinal irritation often accompanies, and seriously complicates, the more simple forms of those diseases. At any period after delivery, where the bowels have been previously neglected or mismanaged, this affection may come on. The symptoms are more gradual in their progress at first: there is general uneasiness, scarcely describable by the patient, often for some days before the more marked symptoms make their appearance; the appetite fails; the tongue becomes coated with either a creamy, or a dirty white; the skin is over cool for part of the twenty-four hours, and that state alternates with irregular febrile heat, accompanied often with headach, and generally a quick pulse; there is frequently deep-seated uneasiness in the abdomen, which is full and rather tense, often rather tender to pressure, but not generally to firm steady pressure; there is a frequent feeling of sickness, and often vomiting: sometimes this vomiting is profuse and incessant, and the fluid ejected is dark and offensive; in many instances this is thrown off the stomach with little or no effort, but apparently from the effect of flatulence. A very common symptom, more especially after the first day or two, is diarrhœa; the evacuations are dark, fetid, watery or slimy, with much flatulence, fetor of the breath, and increased abdominal tenderness; the pulse increases in rapidity; the exacerbations of fever are of longer duration, and attended with great prostration of strength and feeling of despondency; the tongue indicates subacute gastric inflammation—it is sometimes white in the centre with florid edges and tip, the bright red, angry-looking portion suddenly emerging from the border of the white coat; at other times the white or yellow coat entirely disappears, and the whole tongue is left morbidly red, shining, and glossy; in some cases perfectly glazed; in others it is rough, and as it were scalded, the mucous membrane of the mouth being at the same time often covered with aphthæ. The strength of the patient rapidly diminishes under the exhausting diarrhœa and the continual or irregular fever, and death is generally preceded by some of the symptoms of the other forms of puerperal fever. Many of these cases are treated by bleeding, on the supposition that they are inflammatory, but bleeding only aggravates the symptoms. They are also more likely to arise after labours which have been unusually protracted, or where uterine hæmorrhage has occurred to a great extent. In the latter instances, besides the symptoms described, there is much affection of the head; acute pain, with strong pulsation in the centre, confused noises, want of sleep, low delirium, and constant restlessness. In spite of the palpable cause of these distressing sensations, it is by no means uncommon to find this form of child-bed fever mistaken for vascular plethora, and the temporary relief to the head, obtained by the local abstraction of blood, has often led to a repetition of exhausting remedies.

In several instances which have fallen under our notice, where death took place, the most striking circumstance on *post mortem examination* was, the entire absence of organic changes. There was generally a large quantity of air in the intestines and stomach, a pale and bloodless state of all the tissues and

organs, venous congestion in the vessels of the brain, but no lesion sufficient to account for death. In some of the more protracted forms accompanied with diarrhœa, the mucous membrane of the large intestines is now and then found ulcerated in patches; and in other portions of the canal it has assumed a peculiarly smooth appearance in the interspaces of the mucous follicles. Where the condition of intestinal irritation has been accompanied or followed by other symptoms denoting more serious disorder, the appearances on dissection are found similar to those which have been previously described.

It is most important to detect this form of mischief early, and to distinguish it from the more formidable conditions of the puerperal state. They are, however, so often blended or complicated, as to increase materially the difficulty. When uncomplicated, the chief points to be noticed are, the insidious character and slow progress of the symptoms, the state of the tongue, and the condition of the secretions. The absence of acute pain and tenderness is not much to be depended upon, as it has been already observed that those symptoms are not always present in the peritoneal fevers. The irritable state of the tongue, the peculiarly foul and offensive evacuations, and the subsequent diarrhœa, when existing along with the signs of inflammatory mischief in the abdominal or pelvic cavity, whether of the sthenic or malignant character, are all to be taken as evidences of the complication of this state of intestinal irritation with the genuine puerperal fever.

In describing the *treatment*, we shall limit our observations to the simple state of intestinal irritation; the modification of such treatment, when applied to the complicated varieties, must depend entirely on the nature and peculiarities of the accompanying disease. The obvious indications are, to remove the offensive matter from the bowels, to alter and improve the depraved secretions, and to sustain power without increasing febrile action. When we are called to such a case early, a full dose of calomel, James's powder, and opium, may be given, followed in four or five hours by castor oil, which is generally the most efficient and the least irritating purgative. If there be much sickness, so that such remedies will not be retained, from five to ten grains of calomel alone will almost always allay the vomiting; after which, a large enema of gruel and castor oil may be injected. Several successive doses of purgatives will generally be required to remove the scybala and offensive accumulations from the intestines, and a change of purgative will frequently accomplish this, when the first has latterly brought away nothing but watery motions. The repetition of the purgatives must depend on the strength of the patient and on the effect produced, the full state of the abdomen, when felt by the hand, being our guide as to the existence still of an unremoved load. When diarrhœa is an early symptom, or at least has begun before we see the patient, we shall do but little good in our efforts to restrain it, unless we give these active purgatives. Chalk mixtures and astringents only aggravate the symptoms in the first instance, the cause which keeps up irritation still remaining. After we have succeeded in cleansing the bowels, milder alteratives will be sufficient. The Hydrargyrus cum Cretâ, or small doses of calomel combined with ipecacuanha and prepared chalk, may be given at short intervals, interposing some mild laxative, as rhubarb and magnesia, or castor oil, once in one or two days. Where the patient has been much exhausted, an enema of gruel may be given; and if there is much soreness of the lining membrane, laudanum or tincture of henbane may be added. Opium may be combined with the alteratives, especially where the diarrhœa still continues profuse. We have often found advantage in this state, from occasional very small doses (eight to ten grains) of sulphate of magnesia in some spiced water, combined with five or six drops of laudanum. Sometimes the nitric or sulphuric acid with laudanum effectually restrains the diarrhœa, and improves the character of the tongue, especially if there are aphthous ulcerations. The usual astringent remedies are inadmissible in the commencement, and only to be employed if the diarrhœa persist after the bowels have been cleared. The diet should be nourishing, but not stimu-

lating, unless there is very great exhaustion. Arrowroot, gruel, broth, jelly, and other bland articles are the safest. Milk with soda or Seltzer water is very grateful to the patient in allaying thirst and keeping up power, especially where there is sickness. As the diarrhœa subsides, and the secretions become healthy, more nourishment may be taken; but any hurry in this respect, and any carelessness in the nature of the diet, often lead to relapses. Infusions of cascarilla or cinchona, with either ammonia or the mineral acids, may be tried in the convalescent stage, and pure air will be then of great advantage. In cases where the head affection follows exhausting labours, with or without other signs of intestinal irritation, still greater caution is necessary in the treatment. In both, from a disposition to be too acutely alive to all ailments after parturition, there is often an eagerness to use active remedies, and especially to bleed. Such an error is peculiarly dangerous, and yet it is by no means uncommon in the class of cases we are now describing. A foul state of bowels aggravates the head affection, and however weak the patient may be, the judicious and cautious use of purgatives becomes absolutely necessary. The very distressing sensations about the head are best relieved by opium and camphor in full doses, and the alternation of these remedies with the purgatives is the principal point in the treatment. Cold applications to the head, and fomentations to the extremities, give much comfort to the patient, and produce repose. Nourishment is here of great importance; it should be of the lightest description, and frequently given in small quantities; as, though there is an exceedingly rapid digestion, from the natural effort to supply the loss which has been sustained, the power of the stomach has been much reduced, and the food should be that which will be most easily assimilated.

IV. False Peritonitis.

There is a mild form of puerperal fever, first described by the late Dr. Gooch, the existence of which has been denied by some authors, but which has been prevalent at various times, and of which we have seen a great many instances. Mr. Hingeston has published several cases of it in the first volume of the *Medical Gazette*, and, more recently, Dr. Ferguson has given its history in his valuable work on puerperal fever. It seems to be the first stage of the more active inflammatory form, but, as if it stopped there, yielding to treatment which would have no great effect over acute inflammation, and aggravated by active depletion: its morbid anatomy is not to be detected. In those cases which have died, death has either followed a more advanced stage of the disease, when inflammatory mischief has ensued upon the previous symptoms, or it has followed the use of too violent remedies, when no traces of disease sufficient to account for death could be detected on dissection. In many of these cases slight deposits of serum tinged with blood are often found in the serous cavities of the body, the result not of inflammatory action, as there is a pale and bleached state of membrane, but the consequence of over bleeding, which produces what Magendie calls a defibrinised state of the blood, when, its cohesive qualities being lost, it infiltrates through the tissues. This disease has been called "abdominal pain," which is its chief characteristic; but such pains are so various, that such a name is by no means satisfactory. False peritonitis, a name by which it has been long known in our lying-in hospital, is open to objections; but it is short, and will be less likely to mislead. The influence of the nervous system as well as the vascular in producing inflammation is acknowledged, and it would seem that in these cases the symptoms may be traced to that early condition in which the nerves of the peritoneum are chiefly affected, a certain degree of constitutional disturbance is produced, the balance is disturbed, but the vascular system has not yet been sufficiently excited to produce actual inflammation. In most of the epidemics of puerperal fever, this form has existed with the more formidable varieties, but it has now and then occurred to a very considerable extent, when the other

forms of puerperal fever have been rare exceptions. It is characterised by pain and tenderness of the abdomen, a slightly coated tongue, and a rapid, soft, compressible pulse; and though a rigor often precedes the attack, the skin is very little increased in temperature. Dr. Gooch remarks that such symptoms are most apt to occur when the patient, in her ordinary health, is delicate and nervous, or when there has been any irritating cause, such as severe gripings from purgatives, or unusually severe after-pains from collection of coagula. An experienced practitioner will generally distinguish this mild form of puerperal fever by the softness of the pulse, and by the absence of that peculiar anxiety of countenance which marks the more severe forms; but if he were to be guided alone by the usual definitions of puerperal fever, viz. pain of the abdomen with tenderness and a rapid pulse, he would fall into serious error. The effect of remedies in these cases is most important, as diagnostic of their real character: bleeding produces little relief; if carried beyond a few ounces it accelerates, and (we believe) may cause the patient's death; the blood shows no marks of inflammation, and the peritoneum or any of the pelvic or abdominal viscera show no signs of disease. Fomentations, poultices, diaphoretics, and opiates, soon remove the symptoms, and in general this is all that is necessary to be done, in addition to the exhibition of an occasional mild purgative. If in a doubtful case such remedies are tried, and yet the symptoms increase and become more formidable, we may be satisfied that the more active form of disease really exists, and we shall not find that the remedies from which we had hoped for relief will have done harm, or at all interfered with the efficiency of subsequent treatment. Sometimes such a mixed character of symptoms appears, that mild antiphlogistic treatment may be combined with the sedatives and diaphoretics; in such cases Hydrargyrus c. Cretâ, or calomel, may be added to the opium, and James's powder, or Dover's powder: and a few leeches may be also beneficially applied to the seat of the pain.

The effect of nervous irritation and of mental emotion on the frame of a woman after delivery, often produces a collection of alarming symptoms, which have been classed as a distinct form of puerperal fever (the *ataxic*) by Tonnellé and Dr. Ferguson. We are obliged to confess, however, a great difficulty in such a distinction. The irritability of frame which leads to the anomalous symptoms described by these authors, is merely an accidental circumstance. The chief characteristics are, sudden and alarming sinking, almost a total want of sleep, great restlessness, often accompanied with delirium; a most anxious state of mind, with fear of impending death; and a pulse which is strikingly rapid, weak, and irregular. Though there is sometimes no particular pain, there is generally acute pain in some part, principally in the abdomen, the hypogastrium, or the head. Upon a more careful investigation, however, we find that the pulse becomes more steady and tranquil under the influence of cheering looks and words of comfort, or by the attention of the patient being diverted from her malady. The locality of the pain also varies, and if there be tenderness, it is not always localised, the integuments of other parts of the body being very frequently equally sensitive. If we accidentally find the patient asleep, the pulse is scarcely beyond its natural quickness, and the respiration, previously hurried, is observed to be more regular and normal. If these cases are mistaken, and evacuations of blood and depleting remedies employed, the patient will suddenly sink, and on examination of the body, no lesions sufficient to account for death are to be detected. The most effectual treatment consists in giving stimulants, if there be much exhaustion; nourishment at frequent intervals, and opium. In combination with camphor this remedy seems still more efficacious, and both should be given in large doses. From five to ten grains of camphor with one grain of either of the salts of morphia, will often in a few hours subdue every symptom of apparently formidable disease.

The state of body in which such symptoms are apt to occur, is closely allied to, if not identical with, the hysterical condition; which in women, under ordi-

nary circumstances, so often produces, modifies, and magnifies symptoms closely resembling serious organic diseases. By any one who is not conversant with the infinite variety of these nervous or hysterical affections, there is great risk of mistakes being made; and after childbirth, especially, symptoms often arise which similate very remarkably real inflammation of almost every organ, but especially of the brain and the pelvic or abdominal viscera. The diagnostic signs are clearly laid down by Dr. Ferguson in his account of the *ataxic* form of puerperal fever; and the appropriate treatment, as well as the danger of mistaking the disease, forcibly insisted upon: but we must decidedly consider it a fallacy to call this affection puerperal fever at all. Exactly as in hysteria, under ordinary circumstances, we find the sudden migration of the symptoms from the organ apparently affected, the great anxiety and alarm of the patient, the anomalous character of the attacks, and, above all, the beneficial effects of sedative remedies, and of the proper administration of nourishment and stimulants. Such cases are by no means uncommon; they occur among the lower classes, most frequently in gin-drinkers and women of enfeebled constitutions, as well as in the nervous, excitable, and delicate of the higher ranks. They appear to us much more allied to puerperal mania than to puerperal fever, but they most nearly resemble hysteria. It must not be forgotten, however, that in such an excitable state of the nervous system, real puerperal fever may arise; but though it will be additionally difficult to recognise and to treat this combination, attention to the condition of the constitution we have to deal with will materially assist us in meeting the evil. It may be well to observe here, that while practitioners are often misled by the patient's alarm, which invariably aggravates the symptoms, they are not infrequently led into error by their own fears. It has fallen to our lot on several occasions to witness this, and we have known serious injury resulting from being too precipitate in treating disease which only existed in the mind of the medical attendant. Rigors often take place merely when the milk begins to flow; tenderness of the hypogastrium, to some extent, will be found in most women, upon making any sudden or rough pressure for the first few days after delivery. Such symptoms are often inquired for by the practitioner, when his mind has been recently distressed by the loss of a patient after childbirth; and being easily found, the judgment is unsettled, and disease is actually created by the treatment intended to avert it. It is very probable that many supposed cases of contagion might be explained in this manner.

The existence of *erysipelas* in hospitals, or among the infants where the mothers have puerperal fever, has been long noticed. Many such coincidences have happened in the General Lying-in Hospital, and servants and nurses even have been often attacked. This has led some to consider the inflammation which occurs in puerperal peritonitis, &c. to be of an erysipelatous character. In those instances in which the morbid appearances consist chiefly of a copious serous effusion, this may perhaps be the case; but we can hardly assent to this doctrine where firm lymph is deposited. The great resemblance between the effect of parturition on the cavity of the uterus, and what takes place after some important surgical operations, amputation for instance, as pointed out by Cruveilhier, would lead one to expect that erysipelas, so common in the latter instances, would not be rare in the former.

V. Milk Fever.

If under the head of puerperal fevers we are to include all the fevers to which lying-in women are liable, and that are peculiar to the puerperal state, we must not pass over what is commonly called *milk fever*. It is so entirely distinct, however, from those fevers which have been already described, that the consideration of it must be equally distinct. In all women, about the third day after delivery, there is a degree of arterial and nervous disturbance, resulting from the important process which is established at that period for the nourishment of the child. When the breasts begin to be distended with the

lacteal secretion, there is often a slight shivering, the head feels oppressed or painful, the vision is confused, the sleep disturbed, the mind occasionally wanders, and there is thirst, a slight increase of the pulse, and of the temperature of the skin: but in a few hours these symptoms gradually subside, and in numerous instances the disturbance is so slight, that it hardly attracts attention. But in other cases these symptoms are aggravated to an extent which often threatens the patient's life, and demands from the practitioner the most anxious attention. In these severe cases there is a well-marked precursory rigor, followed by great pain and throbbing of the head, with much intolerance of light and sound; the countenance is highly flushed; there is a contracted pupil and injected state of the conjunctiva; the pulse is rapid, full, and hard; the skin intensely hot and dry; the thirst excessive; and the tongue dry and coated. If such symptoms are not speedily alleviated, the milk is no longer secreted, the breasts become flaccid, the head symptoms become more severe, there is violent delirium, and meningitis is evidently established. It is a common expression in such cases, that "the milk flies to the head." It certainly happens in many, that on venesection the serum of the blood is found of a remarkably milky appearance, it is white and opaque, but without any creamy surface. These severe attacks may be generally traced to a too stimulating diet, a heated atmosphere, much exertion and disturbance in attempts to suckle, and still more frequently to mental agitation. They are much less frequent in modern times than formerly, when hot fires, crowded blankets, and brandy caudle, were the usual appendages to the lying-in chamber.

The remedies in the slighter forms of this disease may be limited, in general, to the free administration of saline draughts and diaphoretics, with purgatives which contain the neutral salts; the milk should be gently drawn off, and the breasts fomented or poulticed; the room should be kept cool and well-ventilated; the most perfect quiet should be observed; the mind should be soothed, and agitation or exertion carefully avoided; the diet should be strictly antiphlogistic, and warm diluents plentifully supplied. A remission of the symptoms will then speedily take place, accompanied by a copious perspiration and tranquillity of pulse. In the more severe cases, when inflammation of the membranes of the brain is threatened or actually exists, the free use of the lancet is chiefly to be depended upon. Blood must be taken largely and in a full stream, to be repeated at intervals, according to the necessity of the case and the powers of the patient; but in these attacks the loss of blood is generally borne well. Active purgatives, enemata, calomel in full and frequent doses, antimony, digitalis, and those remedies which depress the circulating power, will be valuable auxiliaries in subduing the violence of the symptoms. Fomentations should be applied to the breasts, and the child occasionally applied, as a means of re-exciting the secretion of milk. Cold evaporating lotions or ice may be kept constantly on the head, the hair being removed, and where the pain is very severe, and not readily relieved by the loss of blood from the arm, leeches or cupping-glasses may be applied to the head, or the temporal artery may be opened. In these cases many practitioners recommend blisters to the scalp, but our experience of them in that situation is not at all favourable, though we have often found benefit from their application to the legs, or to the nape of the neck. Applied to the scalp they have often seemed to increase the delirium and restlessness, and have not acted so favourably as the direct application of cold, the soothing effects of which have frequently been strikingly salutary. One of the earliest signs of recovery is the reappearance of the milk in the breasts, and upon that taking place, the other symptoms usually improve with great rapidity. When, however, the progress of the disease is less favourable, and the remedies fail, symptoms of effusion either suddenly or gradually come on, and coma with dilated pupils, often terminating in convulsions, supervenes. On dissection, the usual results of acute inflammation of the brain are discovered.

There are symptoms somewhat resembling those previously described, and arising from the same cause, lactification, which are also very common, but which are not inflammatory; they are merely nervous, and not uncommonly end in one of the forms of puerperal mania. There is the same restlessness and want of sleep, wandering of mind, and rapidity of pulse; but the skin is cooler than natural, and the pulse weak and irregular. There is readiness to start at the least noise, and an alarmed and anxious look, but sounds are not painful, and there is no dislike to the light. There may be headach, and confusion of ideas, but relief is readily obtained by keeping the head low and by soothing the mind. The milk retires, but it is gradually or irregularly returning at intervals. Such symptoms usually follow anxiety or agitation of mind, undue fatigue in attempts to suckle, over excitement of any description, or exhaustion from hæmorrhage or from diarrhœa. In these cases opium and other narcotics in full doses, with camphor, will speedily calm the distressing sensations, and recovery will be promoted and secured by care being taken to keep the patient perfectly quiet, and to remove every cause of excitement and fatigue. If the convalescence be interrupted by the suckling of the infant, it should be at once discontinued.

DISEASES OF THE SKIN.

Cutaneous Diseases no longer constitute an obscure and uncultivated tribe of disorders. But however easy their study may appear from their occurring on the external surface and being thus evident to the senses, it is soon discovered in investigating their pathology, that in order to obtain a minute knowledge of their Protœan forms, much patient and careful examination of the Book of Nature is necessary.

With regard to their classification it is proper to state that we shall adopt that of Willan and Bateman, with the modifications introduced by M. Biett in his lectures at the Hôpital St. Louis, in Paris. This arrangement, now followed in all the medical schools of Europe, though not free from imperfections, is by far the most practical. After defining the elementary appearances of cutaneous diseases, we shall give the proposed classification; and after describing in detail each special disease included under it, a short summary of a few diseases, which cannot be comprehended under any of the orders, will be added.

Definitions.

The elementary appearances of cutaneous diseases may be reduced to eight: viz. Exanthema, Vesicula, Bulla, Pustula, Papula, Squama, Tuberculum, and Macula. These appearances, constant in all the eruptions of each order, are sometimes blended together, and may be thus defined:—

1. *Exanthema* (Rash). Variously formed, irregular-sized, superficial red patches, which disappear under pressure, and terminate in desquamation.

2. *Vesicula* (Vesicle). A small, acuminated, orbicular elevation of the cuticle containing lymph, which, at first clear and colourless, becomes often opaque or pearl-coloured. It is succeeded either by scurf or a laminated scab.

3. *Bulla* (Bleb). This differs from the vesicle in its size, a large portion of the cuticle being detached from the skin by the interposition of a watery fluid, usually transparent.

4. *Pustula* (Pustule). A circumscribed elevation of the cuticle containing pus. Willan distinguishes four varieties of pustules: *Phlyzacium*, *Psydracium*, *Achor*, and *Favus*. We admit the first and second variety; the one being raised on a hard circular inflamed base, the other always smaller, and without surrounding inflammation. The *achores* are only psydracia. The *pustulæ*, denominated *favus* by Willan, differ in some respects: we consider the *pustula favosa* as the peculiar pustule which constitutes *porrigo*, the form, appearance, and contagious properties of which sufficiently distinguish it from all other pustular eruptions.

5. *Papula* (Pimple). A small, solid, acuminated elevation of the cuticle, in appearance enlarged *papillæ* of the skin, commonly terminating in scurf, and sometimes, though seldom, in slight ulceration of its summit.

6. *Squama* (Scale). A lamina of morbid cuticle, hard, thickened, whitish, and opaque, covering either small papular red elevations, or larger, deep red, dry surfaces.

7. *Tubercula* (Tubercle). A small, hard, indolent, primary elevation of the skin, sometimes suppurating partially, sometimes ulcerating at its summit.

8. *Macula* (Spot). A permanent discoloration of some portion of the skin, often with a change of its structure. These stains may be white or dark-coloured.

CLASSIFICATION.

ORDER I.—*Exanthemata.*
Rubeola.*
Scarlatina.*
Erythema.
Erysipelas.
Roseola.
Urticaria.

ORDER II.—*Vesiculæ.*
Eczema.
Herpes.
Scabies.
Miliaria.
Varicella.

ORDER III.—*Bullæ.*
Pemphigus.
Rupia.

ORDER IV.—*Pustulæ.*
Variola.*
Vaccinia.*
Ecthyma.
Impetigo.
Acne.
Mentagra.
Porrigo.
Equinia.

ORDER V.—*Papulæ.*
Lichen.
Prurigo.

ORDER VI.—*Squamæ.*
Psoriasis.
Pityriasis.
Icthyosis.

ORDER VII.—*Tuberculæ.*
Lepra tuberculosa
Lupus.
Molluscum.
Frambœsia.
Cheloidea.

ORDER VIII.—*Maculæ.*
Lentigo.
Ephelides.
Nævi and Vitiligo.

ORDER IX.—*Purpura.*
X.—*Pellagra.*
XI.—*Radesyge.*
XII.—*Lepra Astrachanica.*
XIII.—*The Aleppo Evil*, or *Malum Aleporum.*
XIV.—*Elephantiasis Arabica.*
XV.—*Syphilida*, or *Syphilitic Eruptions.*

ERYTHEMA.

Syn.—*Inflammatory Blush; Intertrigo; Maculæ Volaticæ; Tooth-rash; Gum; Dartre érythémoide.*

ERYTHEMA designates a slight continuous redness of the skin, of various shapes and sizes; it is commonly symptomatic, not contagious, and exhibits much variety in its form. It is generally acute, lasting from two, three, to ten and twelve days.

Erythema may be produced in children and persons of corpulent habit by external causes, such as the attrition of contiguous surfaces; it then most frequently occurs beneath the breasts, around the axilla, in the groin, and at the upper part of the thighs (*Intertrigo*, Sauvages). Acrimonious discharges, such as those of fluor albus, dysentery, gonorrhœa, and of coryza, may produce erythematous appearances in the circumvening parts; these are alleviated by proper cleanliness, and the application of any simple ointment, or mild absorbent powder.

The varieties of erythema are the *fugax*, the *papulatum*, the *nodosum*, the *læve*, the *centrifugum*, and the *acrodynium*.

1. In *erythema fugax* the patches appear successively on the arms, neck, breasts, and face, in the progress of various febrile diseases either continued or intermittent, in infants at the period of teething, in persons of full habits, and females at the period of menstruation; certain substances, such as copaiba, may also produce it. When it assumes the intermittent type, its continuance depends on that of the disease which occasions it.

2. *Erythema papulatum* affects commonly females and young persons; it occurs chiefly on the arms, neck, and breast, on the back part of the fore-arm, and on the back of the hand. The patches are irregular, of a bright red hue, and are at first somewhat papulated; in thirty-six or forty-eight hours, the slight swelling decreases, but the redness continues, and assumes gradually a bluish tint. The general disorder, though sometimes severe, is generally trifling. Should this papulated form increase and remain seven or eight days,

* For a description of VARIOLA, RUBEOLA, SCARLATINA, and VACCINIA, see SMALL-POX, MEASLES, SCARLET FEVER, and VACCINATION.

we should then have the *erythema tuberculosum* of Willan, in which the elevations appear like small lumps.

3. *Erythema nodosum* occurs commonly in females and young boys of lymphatic habit; it is in general confined to the lower extremities, and the anterior part of the leg. Slight uneasiness, sometimes a little fever, accompany its appearance: it shows itself in large oval patches of a deep red colour, which slowly rise a little above the level of the skin; their number varies, and they are painful to touch. In the course of eight or ten days, if left to themselves, they soften and subside; they never suppurate; the redness disappears slowly, turning blue as it fades. Tepid baths, slight aperients, and at the end a course of bitters, are all that is requisite.

4. *Erythema læve* follows any unusual distension of the skin, and often appears on the lower extremities when anasarcous: the patches are confluent, and the surface smooth and shining; the desquamation which follows its disappearance is in general extensive.

5. *Erythema centrifugum* is a variety first described by M. Biett; it occurs generally in individuals whose health is in other respects excellent. It attacks chiefly the face, beginning by a small red spot slightly papulous, which gradually increases in circumference, and sometimes invades the greater part of the face. The patches are usually round, about an inch in diameter; the redness and heat are great, principally at the margin of the patches, which are elevated, whilst the centre is depressed and of a natural colour; they are accompanied by no pain or itching. This form leaves a slight depression on the part affected; its nature is essentially chronic, although its appearance would indicate that it is acute. Tepid baths, antiphlogistic regimen, and emollient applications, are in general sufficient to remove it.

6. *Erythema acrodynum.* This is an epidemic form, affecting the hands and feet; it was very prevalent in Paris in the years 1828 and 1829. General symptoms, such as uneasiness, headach, nausea, and commonly obstinate diarrhœa, preceded for several weeks the appearance of the rash. The soles of the feet and the palmar surface of the hands were the parts affected. Sometimes the slightest touch brought on violent pains, whilst in other cases the sense of feeling appeared almost obliterated; large exfoliations of morbid cuticle were continually peeling off from the soles of the feet. Adults and elderly persons, particularly male subjects, were most commonly attacked; the rich suffered from it as well as poor. About 10,000 persons were affected with it in Paris. Its duration was sometimes several weeks, sometimes several months. An antiphlogistic regimen, gentle laxatives, tepid baths at first, and afterwards alkaline vapour baths, with the application of leeches around the inflamed margin (not on the erythema), appeared the most efficient means of treatment.

Diagnosis. The circumscribed patches, and, even when widely spread, the evidently superficial character of the disorder, the absence of swelling and of smarting pain, suffice to distinguish erythema from erysipelas. Roseola is also superficial, but then its pink or rosy hue is very characteristic. Rubeola or scarlatina are preceded and accompanied by a set of symptoms peculiar to those disorders; and then the crescentic or semilunated forms of the eruption characterise the former, and the raspberry juice colour of the broad blotches marks the latter. Erythema papulatum might be mistaken at first sight for urticaria or nettle-rash; but the eruption of urticaria is raised in a much greater degree, is without the violet tint of the erythema, is accompanied by such a feeling of itching as is never experienced in this disease, and is most irregular in its attacks. The same variety of erythema may be mistaken for the lichen urticatus, but in this eruption the papulæ are smaller, more round, hard, and much paler; the itching is also very severe. Syphilitic blotches may at first sight be sometimes considered as erythema in one or other of its shapes; but their coppery or greyish colour, and the presence of various symptoms of lues, will sufficiently distinguish them. Erythema at its onset may be mistaken for a much more formidable disease, viz. lepra tubercula. Such a case was lately observed by

Biett: there were no tubercles, but only erythematous blotches, and it might be and had been considered as erythema; but the protracted continuance of the blotches, the diminished sensibility of the skin in those parts, and a long period passed in the Leeward Islands, showed too clearly the dreadful nature of the disease.

The *treatment* of erythema is very simple. When symptomatic, the general disorder alone requires attention. In the constitutional varieties, the antiphlogistic regimen, spare diet, diluents, rest, with a few gentle aperients, and, should the general symptoms render it necessary, the abstraction of a small quantity of blood, aided by the use of the tepid bath, or of the vapour bath if the eruption be of some duration, constitute all that is requisite.

ERYSIPELAS.

Syn. — *Rosa volatica; Ignis sacer; Rose; St. Anthony's Fire.*

Erysipelas is an inflammatory affection of the skin, characterised by a deep red colour of the part, which is hot and rather swelled. The pain is not violent, but has a smarting or scalding character. All parts of the body may be attacked, but it occurs more frequently on the face and limbs; it may, though very rarely, occupy the whole cutaneous surface. We shall describe three varieties: *E. verum*, *E. phlegmonodes*, and *E. gangrænosum.*

1. *Erysipelas verum.* The common erysipelas usually begins after certain initiatory symptoms, which are those of general fever, such as languor, depression, slighter or more violent shivering fits, quick pulse, &c. A red spot soon shows itself, and increases rapidly in extent, varying in colour from a livid red to a bright scarlet; the whole surface is somewhat swelled, but the elevation is more clearly perceived at the borders; the red colour disappears completely on pressure, but returns immediately the finger is withdrawn.

About the third or fourth day of the disease, the cuticle covering the inflamed surfaces is frequently raised in small, and sometimes larger bullæ, from the effusion of yellowish serum beneath: these burst sooner or later, the inflamed surface being then covered with a slight lamellated crust. The local and constitutional symptoms keep pace together, increasing in severity for three or four days, and then decreasing. The extent of the local disorder, however, is not always in an exact ratio with the severity of the febrile symptoms; the constitutional disorder may be extreme when the local disease is moderate, and *vice versâ.*

The most favourable and frequent termination of this milder form of erysipelas is in resolution: the heat, pain, and swelling decrease; the redness verges to a yellower shade, and the cuticle detaches in shreds of different sizes. A peculiar termination of erysipelas sometimes occurs, viz. metastasis; it then suddenly quits the part primitively attacked, and invades in succession several others remote from each other, leaving in the first part some slight discoloration and a tendency in the cuticle to desquamate (*E. erraticum*). The metastasis may likewise take place to internal organs. When there is serous effusion, and consequently swelling to some extent, the redness is less than usual; the skin is smooth and shining, pits readily on pressure, and retains the print of the finger for a long time. This form of the disease is most frequent in debilitated subjects, or in those who have a tendency to dropsy. The affected part is of a dirty brown or a faint red colour, and is much less hot and painful than in the other forms of the disease. Vesication is also less frequently observed; erysipelas with œdema is, however, very liable to terminate in gangrene, which is sometimes induced by the practice of puncturing the skin to allow the fluid to escape (*E. œdematodes*).

2. *Erysipelas phlegmonodes.* In this the local symptoms of inflammation are far more intense: the skin, and strata of cellular substance immediately under

it, are not alone inflamed, deeper layers of this tissue, even those that penetrate between the muscles, and that lie under the aponeurosis, participate in the inflammatory action; the pain is violent and burning, the redness intense, and the swelling considerable: should the inflammation be extensive, the constitutional symptoms may run so high as to endanger life. This form of erysipelas rarely ends in resolution; the pain becomes pulsating on the fifth or sixth day, the redness diminishes, but the swelling increases, and acquires a doughy feel, indicating that the disease has terminated in suppuration. Abscesses of great extent are often formed, which, on being opened naturally or artificially, discharge a considerable quantity of pus, mixed with shreds of mortified cellular membrane. When an entire limb is involved in phlegmonous erysipelas terminating in suppuration, life is often exhausted in the struggle. Erysipelas phlegmonodes sometimes occurs with symptoms of still greater intensity: violent fever is accompanied by delirium; the swelling of the parts is prevented by the aponeurotic sheaths, and, if their structure be not relieved by chirurgical aid, gangrene rapidly takes place. This form is most commonly met with in young and plethoric subjects; it is generally seated in the extremities, and is often accompanied by gastric symptoms of great severity.

3. *Erysipelas gangrenosum.* In this variety the local symptoms are often not severe; *phlyctenæ*, however, form rapidly, and the inflammation of the skin terminates in gangrene. This dangerous form of erysipelas occurs in individuals whose powers are impaired; occasionally in those who have been weakened by typhoid fevers; and in infants a few days after birth, beginning about the umbilicus or genitals. We have seen it destroy in a few days the skin of both breasts in a female after delivery. Though a very formidable disease, the termination is not always fatal.

Erysipelas may be accompanied by peculiar symptoms, according to the regions in which it appears.

Erysipelas of the face is very frequent; the swelling of the eyelids, nose, &c. is so great, that in a very short time the features are scarcely recognisable, and violent headach, restlessness, and often slight delirium, supervene. When the hairy scalp is affected, it may not be perceived at first; the subcutaneous cellular membrane is, in these cases, the principal seat of the inflammation, as well as of suppuration and gangrene, when these take place,—a circumstance owing to the mode in which the scalp is supplied with blood-vessels. In erysipelas of the face and scalp, inflammation of the membranes of the brain is very liable to be produced; serous effusion may supervene, and the patient may become comatose. In some cases, matter forms beneath the scalp, occasioning great irritation, which sometimes terminates in gangrene. Portions of the scalp occasionally slough away, and destruction of the pericranium ensues, leaving the cranial bones completely denuded. In other instances, the cellular membrane surrounding the parotid and cervical glands suppurates.

Erysipelas of the extremities is dangerous when deep-seated, on account of the fascia and tendinous sheaths. That of the scrotum and penis is remarkable for the great degree of swelling which usually accompanies it.

The *causes* of erysipelas are very various. Those who have lived intemperately are peculiarly liable to it, from slight causes. It is met with oftener during spring and autumn, than at other seasons; it is often epidemic, when it is usually a very formidable and fatal disease. It is sometimes endemic in hospitals, prisons, and other situations where many persons are crowded together. Trifling injuries may produce the disease, and it is then often associated with a peculiar state of the constitution of which we know nothing. It is sometimes evidently connected with gastric disorder. Exposure to the rays of the sun (*coup de soleil*), or to cold, may bring on an erysipelatous disorder of the skin in different degrees. Chilblains are an example of erysipelatous inflammation induced by the application of cold. Under some circumstances it seems capable of being communicated by contagion.

Treatment. The general treatment of erysipelas in slighter cases, consists in the observance of the antiphlogistic regimen, the exhibition of mild purgatives and of bland diluent. Other means must be resorted to, should the disorder be severe; bloodletting local and general, emetics, purgatives, and antimonials, must be employed as circumstances require, due regard being paid to the powers of the patient, and to the prevailing epidemic constitution. In general terms, bleeding, to be serviceable, must be practised boldly. In young and vigorous persons affected with severe erysipelas of the face, venesection, and the application of from twenty to thirty leeches behind each ear, commonly produce the best effects; in cases of less severity, the bleeding may be dispensed with, and emetics, aperients, and saline antimonial medicines employed. Lemonade, orangeade, and other cooling drinks, are useful in allaying thirst. Cool air, and a convenient position of the affected parts, or confinement to bed, are indispensable.

The *local* treatment is sometimes important, although it has been imagined that every application to the surface, in erysipelas, increases the disorder. A solution of chloride of lime (in the proportion of one drachm to a quart of water), which is found so beneficial in scalds, may be applied, by means of thin folds of linen constantly wet, to the erysipelatous surface. Should leeches be employed, they must be applied beyond the boundaries of the inflamed surface, and not on the part itself: an advantageous practice is that of applying a given number of leeches immediately after those previously applied have fallen off, the local depletion being thus kept up for several successive hours. The application of the lunar caustic around, but at a short distance from, the diseased skin, has proved especially useful in bounding the erratic form of erysipelas.

In the *phlegmonous* form of the malady, after the adoption of the general treatment, incisions dividing the inflamed skin down to the fascia are often necessary, but should be practised in time to be useful, otherwise they will only serve to give exit to purulent matter, and large portions of sphacelated cellular substance. In phlegmonous erysipelas of the extremities, the continual application of iced water has been found very useful in conjunction with the other means of treatment. Mercurial ointment laid over the inflamed parts, as first recommended by Drs. Dean and Little, of Philadelphia, has been employed with very beneficial effects: friction is not necessary; the ointment should be gently spread over and beyond the parts, and renewed every two hours, pieces of linen being placed over it.

When erysipelas attacks persons of broken-down constitutions, or who have been debilitated from protracted residence in a close and impure atmosphere, intemperance, or mental depression, general bloodletting cannot be practised with safety. The topical abstraction of blood by leeches, or by making numerous slight punctures in the affected parts, as recommended by Dr. Bright, often afford relief. In some of these cases, especially of the œdematous kind, the exhibition of tonics, ammonia, and cordials are required even in the early stages of the disease.

In gangrenous erysipelas, the internal administration of tonics should be immediately commenced; acid drinks, the decoction of bark, wine, opium, &c. varied according to the circumstances of the case, should be prescribed. In the later stages, topical applications, as powdered bark, camphor, poultices of finely powdered charcoal, or solutions of the chlorides of calcium and sodium, are to be employed. Compression by means of a bandage has been practised in phlegmonous erysipelas; but it involves the danger of inducing gangrene; and as it can only be employed at the commencement of an attack, when the efficacy of antiphlogistic remedies is incontestable, it would not be justifiable to waste time upon an experiment generally futile and often pernicious.

This method, however, may be tried with advantage in œdematous erysipelas of the extremities, after the subsidence of the inflammatory symptoms.

ROSEOLA.

Syn.—*Rash; Efflorescentia erysipelatosa; Rose-rash; Rossalia; Rossania; Rosacea; Anomalous rosy Eruption; Rubeola; Rubeola spuria.*

The bright rosy hue of this exanthema, and the variety of its forms, distinguish the roseola from erythema; it is generally preceded by febrile symptoms. The different varieties are the following.

Roseola infantilis occurs in young infants whose stomach and bowels are deranged, or who are teething: it consists in an eruption of numerous, and crowded, deep rose-red spots, or blotches of a circular shape, from a third to a quarter of an inch in diameter, which continue vivid for twenty-four to thirty-six hours, and then vanish.

Roseola æstiva: this eruption, being often accompanied by much fever and difficulty in swallowing, is frequently mistaken for measles or scarlatina: the constitutional symptoms are sometimes very slight: it commonly first appears on the face, neck, and arms, and spreading in a day or two to the rest of the body, there is at the same time a considerable degree of itching. Its duration is usually three or four days, when the eruption disappears without any evident desquamation; sometimes it fades suddenly for a time, returns after a short interval, and then vanishes altogether. This variety is occasionally seen prevailing epidemically during very hot summers. Children and females of delicate complexion appear to be most subject to it.

The *Roseola autumnalis* appears during the autumn on children: the patches are larger than those of the preceding variety, and there is less fever.

Roseola annulata shows itself under the form of distinct rosy rings frequently placed one within the other: it is principally observed upon the abdomen and lumbar regions, on the buttocks and along the thighs. Its duration is sometimes short, but it often continues in the chronic form; the rosy hue is then less vivid in the morning, but increases in the evening, and produces slight itching in the skin. The chronic form appears as an attendant of derangement of the digestive organs. We have twice observed it co-exist with chronic pericarditis.

Roseola febrilis, Roseola rheumatica, Roseola variolosa, and *Roseola vaccina,* are nothing more than a roseolous exanthema preceding or accompanying those various constitutional affections.

Diagnosis. Roseola is distinguished from both measles and scarlatina by the more regularly circular shape and circumscribed appearance of its patches, which are of a deep rose-red colour, larger than those of measles, and smaller than those of scarlatina. The constitutional symptoms of these two latter affections are peculiar, and should always be attentively considered in coming to conclusions in regard to diagnosis. It is not contagious. The annular form of herpes iris might be mistaken for Roseola annulata when the vesicles disappear, but the pre-existing circumstances will assist in the diagnosis.

Treatment. Roseola may be safely left to itself; no local treatment is required. When it is symptomatic of another affection, it is towards this that attention is to be chiefly directed. Rest and an antiphlogistic regimen are alone necessary in idiopathic roseola.

URTICARIA.

Syn.—*Essera; Aspretudo; Uredo Porcelana; Febris urticata; Exanthema urticatum; Epinyctis pruriginosa; Purpura urticata; Papulæ cuticulares; Nettle-rash.*

Urticaria, or Nettle-rash, is a noncontagious exanthematous eruption, characterised by long prominent patches, or wheals of various sizes and irregular shapes, which are commonly paler, although often redder, than the surrounding

skin, of uncertain duration, and always accompanied with burning and very annoying itching.

This disease attacks individuals of all ages and constitutions, but children while teething, young persons, and females, especially of nervous and sanguine temperament and fine skin, seem most liable to it. It is more prevalent in spring and summer than other seasons, yet is sometimes evidently produced by cold. That the leaves of the urtica dioica, some particular articles of food, such as shell-fish of different kinds, lobster, shrimp, crab, and muscles, bitter almonds, mushrooms, cucumbers, and even oatmeal, vinegar, honey, produce this eruption is well-known; some remedies, such as turpentine, balsam of copaiba, &c. taken into the stomach in ever so small a quantity by certain predisposed individuals, always occasion the disease shortly after: indeed, so susceptible are some, that the slightest pinching or rubbing of the skin is immediately followed by the eruption of a prominent itching wheal.

The progress of urticaria is extremely irregular; the wheals commonly last from twelve to twenty-four hours, but they sometimes remain one or two weeks. After coming out several times, urticaria sometimes disappears altogether; in other cases it recurs at intervals for months and even for years. We shall describe the following varieties.

Urticaria febrilis. This, the most common and striking form of the disease, often follows the ingestion of one or other of the articles mentioned: we have also observed it accompany the hot stage of intermittents. After great general uneasiness, with a feeling of weight and pain about the pit of the stomach, the skin begins to tingle and feel very hot; long pale elevated blotches, surrounded by a bright red circle, make their appearance over almost every part of the body, but especially the shoulders, loins, and inner aspects of the arms and thighs, and around the knees. These wheals are prominent, hard round their edges, of different sizes, and very irregular in their outline. This eruption is accompanied by a most unpleasant and violent itchiness and stinging sensation, which are greatly aggravated by the heat of bed; there is also a considerable degree of febrile excitement. When it is produced by the ingestion of certain articles of food, there is violent vomiting and purging. If the eruption be very copious, the wheals run into each other in various places, and then the integuments, and particularly the features, look swollen, feel stiff, and the whole surface is suffused with a bright red blush (*Urticaria conferta*). The eruption does not continue throughout the disease, which lasts seven or eight days: the wheals may disappear in a few minutes; sometimes they remain out several hours, then vanish, and again return perhaps towards evening; very little scratching brings them out. Sometimes slight desquamation of the cuticle occurs at the end of the disease when the eruption has been violent. The urticaria produced by articles of food only lasts from thirty-six to forty-eight hours.

The *urticaria evanida* is a chronic form of the disease; there is no fever; the wheals are very irregular in shape, are not surrounded by any inflammatory blush, and resemble the marks produced upon the skin by flagellation. This variety may last for months; Biett has seen it last seven years. It can occasionally be traced in connection with chronic derangement of the digestive organs, especially of the stomach; but it also frequently torments individuals who enjoy the most perfect health.

The *Urticaria subcutanea*, a very rare variety of the disease, is not at all times attended with the eruption of wheals; and the sensation that accompanies it is not that of itchiness, but violent acute pricking, as if a needle was thrust into the skin; slight red spots scarcely elevated appear here and there; but wheals are very rarely seen. Grief and other moral affections, and also an abrupt change of temperature, seem the special causes of this variety.

The *Urticaria tuberosa* is also very rare, and exhibits characters of great severity. We here find not merely an eruption of slightly raised evanescent wheals that itch more or less, but hard, deep-seated and painful lumps or tuber-

osities, which impede motion. These usually appear in the evening and during the night about the lumbar region and extremities, and vanish next day, leaving the patient fatigued, weak, and excessively depressed. We have seen it accompany a quotidian intermittent, and occasion, by the eruption appearing about the face, throat, and chest, enormous swelling of the features, and accompanied with so much dyspnœa and irregular action of the heart, that the patient, bloated and already blue in the face, was only rescued from death by copious venesection. This case, which had lasted four years, was cured by M. Biett, with Fowler's solution. This variety of the disease generally occurs in intemperate persons.

Diagnosis. Urticaria is easily distinguished. In lichen urticatus, which might be mistaken for it, the eruption is papular, rounder, less prominent, less extensive, harder under the finger, of a deeper colour than the wheals of urticaria: they also never disappear suddenly like the latter. Besides, in lichen urticatus, we always discover in the vicinity of the spots, a number of true papulæ sufficient to declare its nature. Urticaria tuberosa is distinguished from Erythema nodosum by its regular and continuous course. It is necessary to observe that the various species of urticaria are now and then complicated with erythema, often with roseola, and sometimes with impetigo and lichen.

Treatment. Urticaria often requires but rest, diluent drinks, and a few tepid baths. When it is accompanied by severe nervous symptoms, sulphuric ether will be found very useful: should the eruption continue, a few alkaline baths will generally be sufficient to remove it. When chronic, as Willan observes, great attention must be paid to the different articles of food, omitting first one and then another, so as to ascertain with which the eruption is connected Should this treatment not prove efficacious, occasional laxatives, the mineral acids, and the vapour bath will be found advantageous. In those of sanguine complexion, and in young subjects, venesection will often be necessary, even in chronic urticaria. Spices, and spirituous and fermented liquors, must be abstained from. When the disease assumes an intermittent type, bark, or sulphate of quinine, must be prescribed; and should these fail, much benefit will be obtained from Fowler's solution, in small doses gradually increased.

ECZEMA.

Syn.—*Dartre squammeuse humide; Dartre vive; Soussée; Crusta lactea; Gale épidémique; Humid Tetter; Running Scall; Rubores cum vesiculis et pruritu; Dartre squammeuse* of Alibert.

This term (from the Greek ἐκζέω, *effervesco*) has been adopted by Willan to designate a very common non-contagious eruption of minute vesicles, clustered together in broad and irregularly defined patches, always producing desquamation of the cuticle, and terminating generally by the formation of thin flaky crusts. With Biett, who first considered it in this light, we think the varieties of this disease may be included under two heads—*acute* and *chronic* eczema.

Acute Eczema. In the acute forms, we include the *Eczema simplex*, the progress of which is slow, though not chronic; the *Eczema rubrum;* and the *Eczema impetiginodes.*

The *Eczema simplex* appears without precursory symptoms: the vesicles are very minute, closely crowded together, and evolved without any appearance of inflammation or swelling of the skin, either around the clusters, or in the intervals between them: more or less itching accompanies their evolution. These closely crowded vesicles are at first perfectly transparent and shining, but the globule of serum they contain soon grows turbid, and may be absorbed, being followed by slight desquamation of the cuticle only; but more fre-

quently they burst, and scatter their contents upon the surface, where it dries into a thin yellow-coloured incrustation, which soon falls off. This eruption is never followed by a new exudation of serosity, or with the renewal of flaky crusts, as in the other forms. Successive eruptions appear slowly with the same characters, and protract the disease to one, two, or three weeks, and sometimes longer: it leaves no marks on disappearing. Eczema simplex has been known to cover the entire surface, but it is much more frequently confined to particular regions, as the arms and fore-arms, backs of the hands, and skin between the fingers, where it sometimes fixes itself, and is liable to be mistaken for scabies. No apparent derangement of the constitution accompanies this variety; the most troublesome symptom attending it is the disagreeable itchiness, which is sometimes very troublesome. This form attacks more frequently young persons and females: inunctions with the sulphur and mercurial ointments, the contact of sugar and woollen substances, often produce it: it sometimes occurs between the fingers in lying-in females, and in others, without evident cause, during warm weather. Eczema simplex is a slight disease; it often complicates scabies, and then it is produced by the use of the sulphur ointment: it sometimes also coexists with lichen.

The *Eczema rubrum*, so called because the eruption occurs on a red inflamed surface, is a much more severe form. The parts upon which the eruption is about to appear, are swollen, hot, tense, shining, and of a bright red colour. These, upon a careful inspection, are discovered to be covered with numerous minute, prominent, glistening, silvery points. Soon after, small transparent round vesicles appear about the size of a small pin's head, and surrounded by a decidedly inflamed areola. When the disease is slight, between the sixth or eighth day, sometimes before, the redness decreases, the serosity is absorbed, the vesicles shrivel up, and slight desquamation takes place. Examined carefully at this period, we perceive on a red surface (the redness remains for several days after desquamation) closely sprinkled minute round spots, surrounded by a thin white ragged edged rim of cuticle, which indicates the line of separation between the vesicle and its areola. The disease is often still more severe: the inflammation continues and even increases; the vesicles, becoming confluent, open and discharge their contents, which are no longer transparent, but opaque. This discharge, flowing upon a surface previously inflamed, increases the irritation, produces slight excoriations from which a serosity flows in greater or less abundance, preventing at first the formation of incrustations. Within a short time the discharge diminishes in quantity, becomes thicker, and forms, on drying, thin, soft, lamellated, very broad yellowish incrustations, which are renewed frequently, and expose, on falling off, a red, more or less inflamed surface. By degrees the serous exudation ceases, the flaky crusts become more dry, and remain for a longer time: the surrounding skin returns slowly to its natural state, and, healing up from the circumference to the centre, the disease terminates in between two or three weeks. The symptoms too often, instead of decreasing, remain a much longer time, become at intervals still more severe; and, after some months' duration, the malady may be considered as chronic eczema, which will be afterwards described.

Eczema impetiginodes. A still severer species of acute eczema may succeed to the preceding, or it may occur primarily; it is thus termed because the fluid under the cuticle is sero-purulent almost from the first. In this aggravated form the skin is inflamed and swollen: smarting or scalding pains accompany the evolution of the pustular vesicles, which are confluent, almost coherent; they soon break, and discharge a thick, faint, sickly smelling fluid, that dries, not in thin flaky incrustations like those of the eczema rubrum, but in crusts much more thick and yellow, and apparently formed by the superposition of thin, soft, separate lamellæ. The surfaces beneath are raw and excoriated, and exude a reddish serosity: the incrustations are detached and renewed in rapid succession until the inflammation begins to decline; they then become

thinner, remain longer attached, and, as they are thrown off, at length expose surfaces of a less and less intensely fiery hue. The eczema impetiginodes commonly appears on one region only of the skin, and around the pustulo-vesicular eruption distinct vesicles of the eczema rubrum are perceived; but when this aggravated form occupies surfaces of considerable extent, still more so when it is general, as sometimes happens, it is attended with symptoms of great constitutional disturbance. The duration of the eczema impetiginodes is from two or three weeks to thirty days, beyond which period it may be considered as chronic eczema, differing in no respect from that which succeeds to eczema rubrum; in the chronic state the eruption is no longer pustulo-vesicular, but altogether vesicular. Sometimes, in violent cases of eczema impetiginodes, a few pustules of impetigo, or the larger pustules of ecthyma, may be observed, but these are merely accidental.

Chronic Eczema is often a termination of the acute forms of the disease. The skin, incessantly irritated by successive eruptions of sero-purulent vesicles, and the profuse secretion of ichorous fluid, becomes intensely inflamed, furrowed with deep fissures, particularly when the parts around articulations are the seat of the disease, and the inflamed surface is affected with painful excoriations. The serous exudation is most abundant, and requires the dressings to be frequently changed; in removing these great care must be taken not to tear them off forcibly, and thus make the abraded surfaces bleed. The smarting or scalding pruritus is at the same time generally distressing. The disease may continue in this state for several months: when it declines, the pruritus and smarting become less intolerable; the serous discharge diminishes, thickens, and forms soft, yellow, lamellar incrustations, which, after being detached, are succeeded by others still firmer, thinner, and more adherent, whilst the surface of the exposed dermis looks gradually less and less inflamed. The disease often appears on the point of healing, when, without any known cause, the inflammation returns with renewed intensity: the surfaces again become red, successive eruptions of vesicles break out, and all the former appearances are observed. In this manner chronic eczema may last for years, to the incessant torment of the unhappy patient.

In some cases not the slightest exudation takes place; the flaky incrustations become more dry, white, and adherent; the skin is red, thickened, and hardened, and it may thus remain several months. In this state chronic eczema may be mistaken for psoriasis, and the more so, since thethin incrustations appear to be no longer formed by the drying of the exhaled fluid, but, like the squamæ of psoriasis, lamellated scales of morbid cuticle. About the lower extremities, in chronic eczema, some small patches are often found to remain: the skin there appears red, thinner, and shining, and covered with very thin scaly squamæ, the whole appearance rendering the nature of the disease very doubtful, until some fresh eruption of vesicles clears up sooner or later all doubts.

Although chronic eczema affects a small surface only at first, it may spread by slow degrees so as at last to involve very extensive portions of skin: thus patches, in the beginning about the size of a dollar only, have gradually spread over a whole limb.

During all the stages of chronic eczema a most constant and distressing symptom is the violent itching, more insufferable than acute pain. The patient is cautioned in vain against scratching, which increases the itching to almost an insupportable degree, especially when the chronic eczema affects certain parts, such as the scrotum and anus, the upper and interior parts of the thighs or the vulva: in these cases the miserable patients are often reduced to despair.

Eczema may appear on every part of the surface of the body, but those which are most plentifully provided with follicles seem more particularly liable to its attacks; it therefore more frequently occurs about the groins, scrotum, perinæum, axillæ, bend of the arms, and popliteal regions, and in infancy on the scalp, than elsewhere; and the disease assumes such peculiarities, according to

the region in which it is developed, as to make several of these local varieties deserving of particular notice.

Eczema affecting the organs of generation of both sexes, at the verge of the anus, and upper part of the thighs, is one of the most distressing and obstinate of these local forms of the disease: the intolerable pruritus of the eczema of these parts has been already mentioned.

Eczemas of the bend of the arms, groins, and popliteal regions, is often attended with excoriations and deep fissures in consequence of the constant motion of the parts. Chronic eczema around the nipple never spreads far, but it is very obstinate, and often lasts for years.

Eczema of the external ear is another of the most common and obstinate of the local varieties of the disease; it may occur alone, though it is often observed at the same time with eczema of the scalp or face. The skin is much thickened, and the ears often swelled to twice their natural size, the meatus auditorius being so much obstructed, that it may be necessary to introduce pieces of prepared sponge, dried gentian root, or catgut steeped in oil, to prevent its complete closure.

Eczema of the hairy scalp, is one of the local varieties most worthy of notice, as well from its frequency, as from the circumstance of its having been long confounded under the names *tinea* and *porrigo*, with other affections of the same part essentially different in their elementary forms and general nature. This variety of eczema occurs in young children during the different periods of teething, and even in later years. The discharge is very profuse, and the head appears as if it had been dipped in some glutinous liquid. The secretion by and by dries into crusts, by which the hair is matted into little separate tufts. When the disease is extensive, it reaches often to the nape of the neck, forehead, and ears. The inflammation is sometimes so violent that it extends to the subcutaneous cellular membrane, in which small abscesses may form, and to the lymphatic glands of the neck, which become enlarged and painful, the integuments in which they are imbedded often suppurating. The serous exudation is sometimes much less copious; the fluid dries rapidly, and produces an abundant desquamation of scurf, which is renewed in a very short time, falling in abundance on the least friction. In both these varieties the bulbs of the hair very seldom suffer. Eczema of the face occurring in young children has been frequently described under the name *crusta lactea*. Eczema rubrum of the hand is a very troublesome and painful form of the disease; the fingers are much swollen, and the parts being extremely movable, every joint is soon surrounded by deep chaps, which bleed in opening and shutting the hand.

Causes. Eczema is not a truly contagious disorder, although M. Biett has observed several cases transmitted *post coitum*. It frequently affects adults, and females appear more subject to it than males; it often shows itself in spring and summer. The periods of the solstice and equinox are marked by exacerbations of the chronic eczema, as are also abrupt changes of temperature. Acute eczema may be produced by external causes, such as exposure to the sun's rays (*Eczema solare*, Willan), the application of a blistering or stimulating plaster, the inunction of sulphur and mercurial ointments (*Eczema mercuriale*). A burn may also act as an occasional cause, as well as frequent contact of the fingers with sugar, flour, and metallic substances. These causes may certainly produce acute eczema, but a peculiar constitutional disposition appears to explain its passing to the chronic form, and its protracted duration.

Diagnosis. Eczema being liable to be mistaken, in its various forms, for eruptions of a widely different nature, the diagnosis is to be carefully attended to; here, as in many cutaneous diseases, the use of a good magnifying glass is of great assistance. Scabies may always be distinguished from eczema simplex by the following characters: the vesicles of scabies are acuminated, those of eczema are flatter; the scabious vesicles are isolated, those of eczema are clustered; these latter are to be found on the back part of the finger, those of the itch between them; the vesicles of eczema are pale when they first show

themselves, as well as the skin on which they are placed, whilst the vesicles of scabies have a rosy shade, — this is very characteristic ; the itch is contagious, while eczema is not ; lastly, the pruritus of scabies is not so unpleasant, and is not accompanied with the smarting sensation of eczema, which scratching does not allay, but rather renders more intolerable. The constitutional symptoms will prevent its being mistaken for miliaria. From herpes, eczema is distinguished by the minuteness of its vesicles, and the little inflammation that surrounds them; those of herpes being rounder, larger, collected into clusters, and always occurring on a swelled inflamed base. Eczema impetiginodes differs from impetigo by well-defined characteristic features; the vesicular affection always occupies large surfaces; impetigo is commonly confined to a much narrower space. The vesicular pustules of the first do not contain pus, but a yellowish serosity, transparent when it exudes. In impetigo, the fluid discharged forms thick, consistent, firm scabs, very rugged and uneven, of a lighter or darker yellow; whilst the incrustations of eczema are broad, thin, laminated, soft, and of a greenish yellow colour; and besides, around the margins of the eczema the characteristic vesicles may be constantly discovered, which is never the case in impetigo. The traces which the impetigo leaves are of a far deeper red, and sometimes superficial slight cicatrices are perceived, which are never seen in eczema impetiginodes, which only leaves slight red patches.

Chronic eczema is liable to be mistaken for certain forms of lichen. Thus the lichen agrius is equally accompanied by an exudation of serosity forming slight incrustations; but these are of a more scabby nature than those of eczema; they are larger, thicker, and of a more yellow colour ; moreover, when they are detached, we do not find the red, smooth, shining and slightly excoriated surface of eczema, but a surface on which small minute prominent points (papulæ) are commonly visible to the eye, and constantly to be felt by touch. Lichen also much resembles a certain form of chronic eczema, in which the skin is red, thickened, and covered with small scaly incrustations; but in these cases of lichen the skin is much thicker and rougher than in eczema : besides, around the eruption the elementary vesicles or papulæ of the one or the other disease will be discovered on careful examination. When these eruptions are seated on the hands, still greater care is necessary to avoid mistakes. It sometimes requires attention to distinguish chronic eczema from psoriasis, when the surfaces covered by the former are dry and scaly ; but when the scales are detached, the parts are not smooth, dry, and elevated, as in psoriasis, but almost always moist, chapped, and uneven. A very rare form of chronic eczema, in which the eruption is general, the skin red, dry, and covered with thin, whitish, scaly incrustations, may be distinguished from psoriasis by the absence of the thickness and hypertrophy of the skin that accompany the latter disease ; in this form of chronic eczema, the fissures that are observed in the various parts correspond to the muscular contractions and the bends of the articulations, and do not, as in psoriasis, follow all directions. Sometimes it may still be necessary to wait until a new exacerbation dissipates all doubts.

Prognosis. Acute eczema is a slight disease, but in the chronic form, it is a serious one, often baffling the best-directed means of cure. It may accompany lichen, scabies, impetigo, and ecthyma. MM. Biett and Cazenave have seen it change its nature and put on the bulbous form of pompholyx.

Treatment. Eczema simplex commonly requires only light acidulated drinks, tepid baths, and abstinence from all heating articles of food. Should it resist these measures, the alkaline bath will be of great use. The antiphlogistic regimen must be still more severe in the acute stages of eczema rubrum and eczema impetiginodes. Venesection, with and without local bleeding by leeches, is often necessary: it may be requisite to repeat the venesection should the eruption be considerable. All local irritating applications must be expressly forbidden: tepid emollient baths, local bathing with bran-water and other emollients, tepid poultices of potato flower and decoction of marsh-mallow,

will give greater relief than oils and ointments, which become rancid. The primary cause must be attended to, and, if possible, removed.

Chronic Eczema requires the same regimen : occasional warm baths, and the diluted sulphuric or nitric acid, effect a cure : these latter are particularly indicated when the exudation of serosity is very copious, and the pruritus distressing. The baths should never be beyond 88° or 90° Fahr. When the tepid emollient bath does not allay pruritus, the alkaline bath will be found very useful. The carbonate of potash in any of the bitter infusions, or the liquor potassæ in doses of ten or fifteen drops in barley-water, may be taken at the same time that the baths are employed. The local treatment should consist of lotions containing the liquor plumbi-subacetatis in almond emulsion, or of decoctions of dulcamara, or hyosciamus alone, or with the addition of the diluted hydrocyanic acids : these often allay the pruritus. In these cases any of the neutral salts in gently purgative doses continued for some length of time alone, or alternatively with the diluted mineral acids, frequently prove of signal service. Where the disease is of still longer duration, and the diseased surface of greater extent, more active means must be employed ; such as brisk purgatives, sulphurous waters, the vapour bath (not too hot), or the vapour douche. Sulphurous waters may be employed inwardly and outwardly : these baths should be taken alternately with the simple warm bath. As a drink, it is proper to begin by mixing the mineral water with two thirds of milk or barley-water, increasing by degrees the dose of the water. When exacerbations occur, emollients and leeches round the parts must be again employed.

In obstinate cases of eczema, other means still more energetic must be tried ; these are the tincture of cantharides, and arsenic in one or other of its forms : Pearson's arsenical solution is the preparation that M. Biett considers the most easily managed. When the eruption is of small extent, the simple vapour, or the sulphurous vapour douche with or without gelatine, often improves the condition of the diseased surface. Small patches of obstinate chronic eczema may be cured by anointing the parts with the proto or dento-ioduret or the weak nitrate of mercury ointment, which are preferable to caustic.

HERPES.

Syn.—*Tetter ; Dartre ; Olophlyctide.*

Herpes is characterised by the eruption of irregular clusters of vesicles, seated upon an inflamed ground of different sizes, and separated from each other by intervals of various extent, in which the integuments are perfectly healthy. The causes of herpetic eruptions are very dubious : they appear to depend on some unknown irritable state of the constitution, and are most common in persons of a lymphatic temperament and fine fair skin : their origin is often referred to cold, and they sometimes prevail epidemically. Several varieties of this disease are admitted by dermatologists, the individual and distinguishing features being derived either from the seat of eruption or the particular form it assumes.

The *Herpes phlytenodes* is generally preceded for two or three days by slight fever. The local symptoms are painful sensation of smarting and burning heat, that lasts for an hour or two, in the places where the eruption is about to appear, and which are beset with a number of small red spots clustered together. These give place next day to an uniformly inflamed patch, thickly covered with prominent vesicles, firm to the touch, and varying in size from that of a millet seed to that of a small pea. A very distinct inflammatory areola surrounds the clusters thus produced. The vesicles are globular and transparent at first, but the contained lymph becomes milky or opaque in the course of ten or twelve hours, and about the third or fourth day the inflammation round the vesicles diminishes, while the

vesicles themselves, begin to break and discharge their fluid, or to dry and flatten, thin brownish-coloured scabs forming upon them. The incrustations fall off about the eighth or tenth day, leaving a reddened irritable surface, which slowly disappears. A few of the vesicles occasionally become purulent, and, in consequence of the skin underneath ulcerating superficially, the scabs that are formed are longer in separating. As successive clusters go through a similar course, the termination of the whole is not complete before the thirteenth or fourteenth day. The eruption has no certain seat, but it is generally seen on the upper parts of the body, on the cheeks, chin, neck, chest, and arms. The number of the clusters is extremely various; it is greater when the clusters are small, but when of a large size there are generally not more than two or three, and sometimes there is only a single very large cluster. The size of these varies from that of a shilling or half crown piece, to that of the hand; sometimes it spreads over the greater portion of the surface of the body.

Its duration is rarely beyond a fortnight, even when successive eruptions appear; it may, however, put on a chronic form: we have seen in Biett's wards an herpetic cluster of the size of the palm of the hand, seated on the lower and inner part of the thigh, last for more than six months. The burning heat and painful sensation that accompany the whole course of the eruption continues sometimes after it has disappeared, as is the case with the herpes zoster.

Diagnosis. The elementary form of the disease — a cluster of vesicles of different sizes crowded together upon an inflamed surface — is sufficient to distinguish herpes from the other vesicular and bulbous eruptions. In Pemphigus there is certainly only a single bleb or an inflamed portion of skin, but this is not elevated like that on which the herpetic vesicles appear. The vesicles of eczema are smaller, redder, and much more confluent; even when those of herpes are very small, there are always several by which the nature of the disease is clearly indicated.

The *Herpes labialis* is a common and well-known eruption affecting the lips, and which frequently appears as one of the sequelæ of a catarrhal affection, and still more often of intermittent fever. A sharp burning sensation precedes a short time the eruption of a small cluster of transparent vesicles, several of which run generally into each other, and frequently form globules of the size of a pea: the contained fluid is at first transparent, but soon becomes opaque, and desiccation takes place in a few days. A similar eruption of vesicles occasionally appears at the same time over the tonsils and uvula. It is a trivial disease, producing pain and difficulty of deglutition.

The *Herpes preputialis* is readily known by the vesicular nature of the eruption, and when acute is also unimportant. M. Biett has met with several chronic forms of it in which the prepuce is thickened, hardened, and chapped: successive eruptions keep up the disease, which may thus last for months. Some attention is necessary to prevent this local affection being mistaken for primary syphilis.

The *Herpes zoster* or *zona*, known by the common appellation of *shingles*, appears most commonly on the parietes and base of the thorax, and almost always on the right side, where it forms a sort of half circle or belt. It is sometimes seated on the neck, on the face, or on the right side of the head. It spreads in some cases from the body along the inner part of the right arm; we have seen two lines of the herpes zoster commence from the same half circle, the one following the right leg, the other the right arm. It is rarely met with on the limbs. The cases mentioned of the belt extending entirely round the body must have been cases of herpes phlyctanodes, not of zona.

The disease commences by one or more irregular red patches, the one not far distant from the other, which appear successively; the second being seated near the first, and the third near the second, and so on. These erythematous patches, when closely examined soon after their appearance, are found thickly beset with numerous small, shining, silvery-looking points, which increase ra-

pidly in size, and soon acquire the form and aspect of distinct transparent vesicles about the size of small pearls; these are fully developed within three or four days after their appearance, but seldom exceed the size of a large pea, although it does occasionally happen that, by coalescing, larger bleb-like collections of serosity are formed. Each cluster runs a similar course. The skin upon which the vesicles appear is of a vivid red, and the several clusters are surrounded by an inflamed areola a few lines in breadth. The eruption is preceded by a feeling of heat, tension, and pain sometimes of great severity. This state continues till the fourth or fifth day from the formation of each particular group, when the redness begins to fade, the vesicles becoming turbid, dark-coloured, or purulent, and shrunk on their surfaces. They dry up successively, and are succeeded by small, thin, lamellar incrustations, of a dark brown colour, which are detached about the tenth or twelfth day of the disease, leaving deep red stains behind them, which only disappear very gradually. It sometimes happens that from scratching, or the friction of the bedclothes, the clusters seated on the back are slightly excoriated, whereby the cure is protracted. In the worst cases of zona, and in cachectic subjects, portions of the affected integument are even observed to become gangrenous. Long after all traces have disappeared, the parts affected frequently continue to be the seat of deep, dull, and very distressing neuralgic pains.

Herpes circinnatus is a very common variety, characterised by an inflamed red ring, commonly perfectly circular, and upon which numerous small globular vesicles appear, which, though at first perfectly transparent, soon become turbid; these burst, and discharge a thin fluid, which forms a thin lamellated incrustation, that soon becomes detached, leaving a bright red mark. Sometimes the fluid is absorbed, the vesicles fade and fall off in thin scurfy exfoliations.

The duration of this disease is about seven or eight days for each ring; but as successive rings appear, and go through a similar course, it may last between two or three weeks.

Herpes circinnatus occurs on all parts of the body, but most frequently on the neck, the face, the shoulders, and arms. This eruption is often observed on the cheek or chin of young females with fair and delicate skin. Its causes are very uncertain.

Diagnosis. The annular form of this eruption renders it liable to be mistaken for porrigo scutulata, known also under the name of *ringworm;* but this latter is a pustular, contagious, and chronic disease, seated on the hairy scalp, and causing the loss of the hair. Slight attention is required to distinguish it from lichen circumscriptus, the rings of which are narrower, and the eruption papular: the duration of the two diseases also is essentially different.

The *Herpes iris*, first described by Bateman, is characterised by small vesicular clusters surrounded by several erythematous rings, presenting different shades. Vesicles sometimes appear on each ring, but more especially on the middle patch. Small minute red spots are rapidly succeeded by the peculiar rings that characterise the disease. On the second day, a distinct vesicle occupies the centre, round which a number of small vesicles soon congregate. The patches are at first small, and gradually attain their full size, which is between that of a sixpence and a shilling, in the course of a week or nine days, at the end of which time the central part is prominent and distended, and the vesicular circles are also turgid with lymph; after remaining stationary a day or so, they gradually decline, and entirely disappear in about a week more. The central vesicle is of a yellowish white colour: the first ring which surrounds it is of a brownish red; the second of a dirty white; the third, which is narrower than the others, is of a deep dusky red; and the fourth, which shows itself last, is of a pale rosy hue, which fades imperceptibly into the colour of the surrounding skin. The disease terminates by the absorption of the fluid and a slight subsequent epidermic exfoliation, or by the bursting of the vesicles and the formation of thin scaly incrustations, which are detached before long.

Herpes iris is a trifling and very rare disease. Its usual seat is the face, neck,

back of the hands, ankles, and insteps. Like most herpetic eruptions, sudden exposure to cold appears to be an exciting cause: it may also follow catarrhal affections.

Treatment. The different varietes of herpes require but little treatment. The more severe cases generally yield to rest, antiphlogistic regimen, diluent drinks, tepid baths, and the application of the ung. plumbi subacet. Should the disease prove obstinate, a few doses of aperient medicine may be exhibited at intervals.

SCABIES.

Syn. — *Itch; Psora* (Gale); *Rogne.*

Scabies, or Itch, is a very common contagious disease of the skin, characterised by an eruption of distinct, slightly acuminated transparent vesicles, and accompanied by constant importunate itching.

The itch is commonly met with in young persons, and in males oftener than in females. Tailors, sempstresses, and old-clothesmen, are most frequently affected with it. The immediate cause of the itch is now ascertained to be the presence of an insect, the *Acarus scabei;* at least the existence of this insect is now placed beyond doubt by the recent researches of M. Renucci, which confirm the former assertions of Avenzoar, Hafenreffer, Bonomo, Cestoni, Ingrassias, Joubert, and Moufet. The acarus is to be found, not in the vesicle, as Gale asserted, and thus misled observers, but at the end of a small reddish furrow, sometimes straight, sometimes crooked, about two lines in length, which begins at the vesicle and finishes with the insect. A minute subcuticular white spot is often perceptible near a distinct vesicle: on raising the cuticle with a pin, a small white corpuscle, which moves when lifted with the point of the pin, becomes visible: this is the acarus. The serosity contained in the vesicles does not appear sufficient to produce the itch, whilst the acarus immediately produces the vesicles; but it yet remains to be explained, why the itch is so easily caught by only touching the hand of a person infected with it, for it is difficult to extract the insect furrowed under the cuticle.

Scabies appears on almost every part of the body; but it is more frequently seen between the fingers, on the wrists, and on the flexures of the joints. The time that elapses between the infection and the appearance of the disease has been pretty accurately ascertained: in children it varies from four to five or six days; in adults from ten to twenty, according to the season, the period of incubation being longest in winter; in the aged the interval is still further protracted, and still more so when any internal inflammation exists.

The first symptom of scabies is a violent itching in the parts that have been infected; this increases at night, and is exasperated by stimulants of every description, and by the warmth of bed. Small vesicles with acuminated and transparent summits, appear and multiply quickly in young subjects, in whom they are of a pale rosy colour; in the aged, their number increases less rapidly. Sometimes a few vesicles only are seen here and there between the fingers and on the wrist, the pruritus being not very troublesome; but when they are numerous, the itching is incessant and annoying. The vesicles, torn by the nails of the sufferer, discharge a serous or viscid fluid, and change into small red inflamed spots. When the irritation is great, and especially in young subjects, impetiginous, or even ecthymous pustules sometimes complicate the itch.

Diagnosis. Scabies is apt to be confounded with other vesicular and even papular eruptions. The vesicles of eczema simplex are flatter, more confluent, and not contagious; those of scabies are distinct, acuminated with a light rosy base, and the acarus may be found on careful search. The itching in eczema is a painful smarting, not allayed by scratching; in scabies the sensation is not altogether unpleasant, although very annoying. Prurigo attacks the back and shoulders, and affects the outside of the limbs in the line of their extension; whilst scabies, when it occurs on the body, is found on the abdomen, and on

the extremities along the line of their flexions. The eruption of prurigo is papular: these papulæ, almost always torn, present at their summits small dark brown crusts of concreted blood; the vesicles of scabies, when broken, effuse a viscid fluid that dries up in a thin yellowish scab. Finally, the itching in scabies is not painful, whilst that of prurigo is sharp and biting. Slight attention will suffice to discover the papular nature of lichen simplex, in which the papulæ are usually crowded together, and occur in patches on the back of the hands when this is the seat of the eruption; not between the fingers, like the itch. The papulæ of lichen scarcely differ from the prevailing tint of the surrounding integuments, whilst the vesicles of scabies are almost always slightly red and inflamed.

The diagnosis of scabies is sometimes complicated, and made much more difficult by the coexistence of vesicular, papular, or pustular eruptions.

Treatment. Scabies never tends naturally to a cure, but may last for years. The treatment consists in destroying as soon as possible the acarus. According to experiments made by M. Albin Gras, a concentrated solution of the hydriodate of potash kills this insect in the shortest time. It lives sixteen hours in vapour of burnt sulphur; three hours in water; two hours in olive oil; one hour in the acetate of lead; one hour in pulverised brimstone; three quarters of an hour in lime water; twenty minutes in vinegar and spirits of wine; twelve minutes in a solution of sulphuret of potash; and only from four to six minutes in a solution of hydriodate of potash. The ointment of this latter substance may therefore be considered as the best application to the affected parts, in the proportion of about half a drachm to an ounce of axunge. Half a drachm of the sulphuret of lime, mixed with a little olive oil, and rubbed upon the palms of the hands twice a day, for ten or fifteen minutes each time, proves also an efficient remedy. Helmerich's ointment, composed of one part of the subcarbonate of potash, two of sublimated sulphur, with eight of axunge, generally effects a cure in ten or twelve days. The sulphur-water bath generally proves effectual in about twenty-five days on an average. The fumes of the sulphur should be avoided: they may however become a useful auxiliary in aged persons. Should much inflammation occur, or if vesicular or pustular eruptions complicate the itch, all irritating frictions must be suspended, and tepid emollient baths employed. Even after the cure is effected, a few tepid baths will be useful.

To disinfect the woollen clothes of patients, they may be subjected to the fumes of sulphurous acid gas, easily procured by the ignition of a rag dipped in melted sulphur.

MILIARIA.

Syn. — *Sudamina; Febris miliaris; Millet-seed Rash; Purpura alba; Purpura rubra; Papula Sudoris; Hydroa-suetta miliaire.*

Miliaria is characterised by an eruption of vesicles which, in general, do not exceed the size of a millet-seed. They are spread over a surface more or less extensive, and are, in most cases, symptomatic of some more important affection. It sometimes constitutes an important symptom of the disease, as in the epidemic miliary fever: sometimes it may be regarded as an accidental occurrence of little importance, as when it precedes the eruption of small-pox or measles, when it occurs in the last stages of adynamic fevers, and in certain diseases where the serous membranes are more or less affected. In those latter cases, the term sudamina is most appropriate; whilst that of miliaria more especially belongs to that severe and often fatal complaint, known by the name miliary fever.

Causes. The miliary epidemic attacks adults, especially those of the lymphatic temperament. Women are more liable to it than men. The existence of miliaria as an essential eruptive fever has been disputed by many

authors, who also attribute the occurrence of the eruption in puerperal and other fevers to the hot regimen to which the patient has been subjected, and to the exhibition of heating or sudorific remedies. We believe, however, that the miliary fever of Sydenham, the miliary sweat of other authors, merits a distinct place in a nosological arrangement; and if the hot and stimulating treatment occasionally excites the eruption, we have often witnessed its development where the practice was strictly antiphlogistic.

Epidemic miliary fever is particularly prevalent during hot and dry summers: it frequently appears in the progress of intermittent and remittent fevers, in puerperal fever, especially when complicated with extensive serous inflammation, in scarlatina and rubeola, in rheumatism, gastro-intestinal and pleuritic affections.

The same phenomena of cutaneous excitement and profuse sweating are observed in cases where miliaria is not accompanied by any other disease, and which must therefore be regarded as idiopathic; as, for instance, when it appears in persons of sound health, after having used great exertion during the heat of summer. The eruption is then attended by sensation of heat and troublesome itching: the number of vesicles is sometimes very considerable, but their duration is very transient, and after twenty-four hours they generally disappear.

Symptoms. Miliary fever comes on with shivering, extreme faintness, painful constriction of the thorax, and difficult respiration. The pulse is soft, rapid, and often intermitting. These symptoms continue for three or four hours, and are succeeded by increased heat and sweating, without any abatement of the faintness or dyspnœa. There are wandering pains in different parts of the body, cramps of the extremities, anxiety, frequent sighing, and restlessness. This precursory stage varies from three to six or even eight days before the eruption appears. About this period, sensations of burning, pricking or stinging, are felt over some portion of the body, most frequently over the sides of the neck, the limbs, the chest and epigastrium, and more rarely over the face. In almost every case the eruption covers a limited surface of more or less extent, but, in a few instances, the whole body has been affected. It is remarkable, that in this complaint no mitigation of the symptoms follows the development of the eruption.

The vesicles are sometimes arranged in patches more or less distant from each other. Sometimes several vesicles coalesce, and form bullæ of a large size, compared with the rest of the eruption.

The vesicles are at first small and prominent, and so transparent, that their contents appear like limpid water, or sweat drops, resting on the surface of the skin. Afterwards the eruption assumes a globular form, and the aspect of the contained fluid becomes milky. The surface upon which the vesicles are scattered is of a deep red colour resembling erythema, which, in consequence of the transparency of the eruption, is very perceptible (*Miliaria rubra*).

At a later stage of the disorder, when the clear serosity is replaced by the milky fluid, the vesicles covering the red surface present a singular pearl-like appearance (*Miliaria alba*). This is particularly remarkable in scarlatina, where these vesicles appear in large numbers upon a deep strawberry-coloured surface.

When allowed to follow their natural course, the vesicles of miliaria always terminate in resolution, without forming scabs. In every case desquamation of the cuticle occurs, sometimes to a considerable extent, but often limited to the spots previously occupied by the eruption. The duration of the disease is uncertain, varying from three to seven or eight days from the period of its development. In general, the disease is prolonged by the appearance of successive eruptions in different situations, and sometimes a second crop is produced on the same surface.

But in miliary fever, the subsidence of the cutaneous affection does not remove the danger: other symptoms often remain connected with the lesions of important organs, which constitute the principal source of danger. We must

not, however, consider the vesicular eruption as altogether unimportant, as we have observed many cases, and many others have been reported by authors, where the non-development or the retrocession of the eruption has been followed by formidable symptoms. This accident may not only be occasioned by physical causes, as the application of cold, improper regimen, &c. but may rapidly follow powerful moral emotions.

Diagnosis. Eczema is the only cutaneous affection with which miliaria could be confounded. It may be distinguished by the acute affections with which it is connected, by the rapidity of its progress, and its short duration. Moreover in eczema, the vesicles are very confluent, a large number being crowded into a small space, while in miliaria they are generally isolated and larger.

Treatment. The vesicular eruption requires no treatment, the general affection alone requiring attention. In the greater number of cases, cooling and antiphlogistic remedies are required. The patient's room should be airy and cool, and the blankets removed from the bed: cold acid drinks may be taken, but stimulants of every description must be strictly prohibited. Sponging the surface with tepid vinegar and water has sometimes a very refreshing effect. A saline aperient to keep the bowels gently open may be administered occasionally. In the miliary epidemic the same means may be pursued, with antimonial diaphoretics, as recommended by Sydenham and others.

VARICELLA.

Syn.—*The Chicken-pox; the Swine-pox; Variola spuria; Pemphigus varioloides; Verolette; Petite vérole volante.*

Varicella is a non-contagious disease, characterised by a vesicular eruption more or less abundant, generally preceded and accompanied by febrile symptoms; desiccation beginning from the fifth to eighth day. Of late years, some questions of great importance have arisen in connection with varicella, which it will be necessary to notice before entering into the general description of the disease.

In its original signification, the term varicella was employed to denote a slight vesicular eruption, which was considered to be a variety of small-pox. These two affections were afterwards shown, by the researches of Dr. Heberden (*Trans. of the Coll. of Phys.*, 1767), to be distinct in their causes, symptoms, and duration. Many physicians however adhered to their original opinions respecting the identity of chicken-pox and small-pox, and cases were continually occurring which were of a character so doubtful, that the most experienced practitioners were unable to decide to which they properly belonged. With the introduction of vaccination fresh difficulties arose: a new species of varioloid disease was introduced, in which the febrile excitement was slight and transient, and the eruption vesicular, bearing in these respects a close resemblance to chicken-pox. The disputes respecting the nature of varicella continue to the present day, and we shall briefly only allude to the arguments advanced by the advocates of either side.

Dr. Thomson of Edinburgh having remarked that during the prevalence of epidemic small-pox, vesicular eruptions, having a perfect similitude to varicella, were developed simultaneously and under the influence of the same causes as variola, either in persons who had been vaccinated, or individuals who had previously had small-pox, was naturally led to conclude, that these eruptions, having one and the same cause, should be considered as varieties of the same disease.

In these epidemics, and in others which we observed some years ago at Paris, the eruptions might be divided into three groups:—1. variola, properly so called; 2. the varioloid disease, or modified small-pox; 3. a purely vesicular eruption, offering all the appearances of varicella. All these different forms of the disease were observed in the same localities, and examples of each might often be

met with even in the same family, and it was found that the milder forms occurred in those who had been vaccinated, or who had already had small-pox.

But Dr. Thomson maintains that varicella also is nothing more than modified small-pox, and supports this opinion by the following arguments; 1. persons placed in contact with patients affected with chicken-pox have contracted variola, and the contagion of the latter affection has given rise to varicella; 2. that wherever small-pox is epidemic, varicella is also observed; 3. chicken-pox is never developed, except in persons whose constitutions have undergone some modification from vaccination, or a previous attack of small-pox. This opinion of Dr. Thomson, however, is far from being generally adopted, even by those who coincide with him entirely respecting the varioloid nature of the vesicular eruptions observed in small-pox epidemics. They argue, 1. that the true vesicular varicella cannot be transmitted by inoculation, and never under any circumstances generates small-pox; 2. that those persons who regard varicella as contagious, have confounded it with the modified small-pox; 3. that chicken-pox may occur in persons who have not been vaccinated, and who have never had small-pox, in whom it cannot therefore be regarded as the modified disease; 4. that vaccination practised shortly after the subsidence of varicella observes its regular course, which is never the case after variola; 5. that the course of varicella is always the same, whether it shows itself after vaccination or after small-pox; 6. that both these affections may prevail as epidemics, independently of each other. We have known it prevail epidemically to a remarkable degree in localities where not a single case of small-pox was observed.

Notwithstanding this question must be considered as still undecided, we have placed varicella among the vesiculæ as an affection distinct from small-pox.

Though, in general, there is only one attack of the disease during life, it is sometimes developed several times in the same individual. It is chiefly observed in young persons, but adults are not free from its invasion.

Chicken-pox, as has already been stated, is characterised by an eruption of vesicles more or less numerous, appearing of a certain size, and scabbing from the fifth to the tenth day. The vesicles at first transparent become afterwards opaque; they are most frequently dispersed over the whole body, but by successive eruptions.

There are two varieties of varicella. In the first the vesicles are small, but slightly elevated, and contain a colourless fluid. It is to this form that the name chicken-pox is more properly applicable. In the other, the vesicles are large, globular, soft, and broader in the circumference than at the base. The contained fluid is limpid at first, but afterwards has a milky appearance (*Swine-pox*).

Varicella is preceded by a sense of general uneasiness, languor, thirst, anorexia, and constipation. In many cases there is nausea, vomiting, and epigastric pains; the skin is hot, the cheeks flushed, and the pulse accelerated. Sometimes there is sore throat, or a slight bronchial affection. The eruption usually commences on the second or third day; appearing first on the trunk, more rarely on the face, and continues to arise in fresh places successively during several days. The febrile symptoms do not in general subside until the third or fourth day after the occurrence of the eruption.

In the varicella with small vesicles (*Varicella lenticularis* of Willan, *Chicken-pox*), small, pointed, transparent, red vesicles appear suddenly on the first day, and increase in size for two or three following days. On the second or third day, the fluid has a milky appearance, and the vesicles become shrivelled; on the fourth day they are surrounded by red areolæ. Desiccation begins on the fifth day, and on the sixth the vesicles are changed into small brownish scales. These desiccate from the circumference towards the centre, and fall off about the ninth or tenth day. As the vesicles appear in succession for two or three days, the different stages of the eruption may be seen at once in the same individual, so that the duration of the complaint may be prolonged until the eleventh or twelfth day.

Varicella with globular vesicles (the *Varicella globata*, or *Swine-pox*) is preceded by the same symptoms, and developed in a similar manner. The red points are quickly replaced by large round vesicles, containing a transparent fluid which becomes opaque on the second day of the eruption. The vesicles have then reached their greatest size; they are soft and flabby; their colour is of a pearly white, and their circumference is larger than their base, which is surrounded by an inflammatory areola.

About the second day the vesicles become faded and wrinkled; their fluid is thickened and converted into a yellow colour. As the itching is generally very considerable, it often happens that the vesicles are torn, especially in children, by which the inflammation is increased, and yellow pus of more or less thickness formed. This accident most frequently occurs on the face, where the succeeding scabs may remain a considerable time, and produce permanent scars or pitting. This occurrence may also take place in the preceding variety.

The vesicular are succeeded about the fourth day by lamellated scales of a brown colour. These also desiccate from the circumference towards the centre, and fall off about four or five days after, leaving little red marks which gradually disappear.

Diagnosis. Varicella is readily distinguished from well-developed small-pox, even of the distinct kind, by the progress and character of the variolous pustule, but it is not so easy to distinguish it from modified small-pox. In this latter affection, the precursory symptoms are generally severe, and, among others, pain in the loins is especially remarkable, which is never the case in varicella. In modified small-pox, the eruption is pustular: the pustules are small, circular, and generally depressed in the centre. Frequently, after the disappearance of the scaly incrustations, small tubercles are perceptible, which subside very slowly. In varicella, the vesicles are at first transparent, but their fluid subsequently becomes of a sero-purulent character: they are never succeeded by the little tubercles, as in the modified small-pox. We may add that varicella is not, in our opinion, a contagious disease, while modified small-pox may be communicated by inoculation, and may even excite a severe form of Variola.

The *treatment* of varicella is very simple. The patient should be kept in bed in a room of moderate temperature. All stimulants should be withdrawn, and some cooling beverage and an occasional mild aperient prescribed.

PEMPHIGUS.

Syn. — *Febris bullosa; Febris vesicularis; Hydatis; Febris Pemphygodes; Pompholix; Phlyctæna; Bulla; Dartre phlyctenoide confluente; Febris ampullosa; Hydroa.*

Pemphigus (πέμφιξ, *bulla*) is a bullous eruption, characterised by the formation on various regions of the body of one or several isolated bullæ of varying magnitude, each of which rise upon a circular erythemous red patch. The chronic form of this disease is known under the name of *Pompholix diutinus.*

Acute Pemphigus appears to be a rare disease, since Willan and Bateman do not admit its existence. We have observed several very distinct and severe cases. The disease may be confined to a particular region, but it occupies in general a pretty large surface: we have seen it invade the whole surface of the body at once. The initiatory symptoms of the eruption are in one case very slight, consisting of more general uneasiness, some degree of pruritus of the skin, and a greater quickness of the pulse than natural: in another, they run much higher; the skin is dry and parched, with irregular shivering fits, followed by hot skin and thirst preceding the attacks from twenty-four to forty-eight hours. The eruption then appears, at first, consisting of a number of small distinct circular patches, which spread rapidly, and are soon covered

with a bleb, which may occupy the whole of the inflamed spot, or only a part of its surface; some of the red spots, indeed, are never covered by blebs at all, but if the finger be passed over these blotches, a slight elevation is perceivable, the cuticle being very readily detached by friction, on account of a slight subcuticular serous exudation. The intervening skin is always healthy. When the bleb covers the whole of the red patch, there is almost no inflamed areola; whilst this may be wide, when only a very small bleb rises in the middle of a large blotch. The size of the bullæ varies from that of a pear to that of a walnut, and, when several blebs coalesce, they may exceed a goose egg in dimensions.

At their height these bullæ are distended with pale yellow serum, but soon begin to shrivel, and their contents to become turbid. The greater number burst, some in the course of the first twenty-four hours, though not generally until after the second, third, or even the fourth day, and are succeeded by thin brownish-coloured incrustations. The disease lasts, in general, from one to three weeks.

The general symptoms that accompany pemphigus in its progress vary as much in intensity, as those that precede the eruptions; in one case, they are so slight as not to require the least care; in another, they seem to endanger life from their violence.

The *Pompholix solitarius* (Willan) is a rare variety of acute pemphigus, characterised by the evolution of no more than a single bulla at a time, which is generally of a large size. The disease, however, does not usually terminate with the formation of one bleb. Within a day or two after the first has disappeared, a second comes out in some spot near it, and this is frequently followed by a third or fourth, all of which pursue a similar course.

Chronic Pemphigus (Pompholix diutinus), is a far more common form than that just described. It is observed in adults, and often in elderly persons, more rarely in females. This eruption often covers the whole surface of the body simultaneously, or may be confined to particular regions: it is rarely accompanied by general febrile symptoms, except when very extensive. Numerous red pimple-like elevations appear with a sensation of tingling, which soon attain the size of a filbert or a walnut, and sometimes that of an egg. They contain a pale yellowish serum which, when not discharged by the bursting or breaking of the bleb, becomes reddish on the third or fourth day, whilst the bulla shrivels up; but they commonly burst, and the detached cuticle dries up, shrivelling towards the edges, and leaving a sore and excoriated surface, which heals sooner than might be expected. The bullæ continue to rise in succession on different parts of the body, and even in some cases reappear for several weeks on the parts first affected, and pass through the same stages, so that commonly on the same individual there are bullæ in all stages, some appearing, others shrivelled up, and many fully extended by the exuded serum. Thin, scaly, pale-brown encrustations form over the excoriated parts, and the part that has been the seat of the eruption is covered with irregular blotches of various extent.

In some rare cases, chronic pemphigus occupies at one time the whole cutaneous surface. The bullæ then coalesce, the serum thickens, and, on drying, form thin yellow incrustations, which might be mistaken for those of impetigo, were it not for their peculiar shape. The greater part of the body may be covered with these incrustations, many of which are higher and thicker in the middle, whilst their circumference is thin and somewhat shrivelled up, and when close, they sometimes overlap each other. Successive eruptions may protract the disease from a period of several weeks to one of several months, and even of many years. It often shows itself in summer, and only disappears at the end of autumn.

This form of pemphigus is sometimes complicated with herpetic eruptions and prurigo. In the variety denominated *Pompholix pruriginosus* by Willan, the most remarkable and distinguishing character is the intense pruritus with which the eruption is accompanied.

Acute pemphigus attacks all ages: it is to be met with in new-born children,

adults, and elderly persons. In the chronic stage it affects elderly individuals, especially those of cachectic habits; low living, damp dwellings, and over-working, are predisposing causes.

Diagnosis. In rupia the bullæ are always followed by ulceration, and the scabs are of great thickness; in pemphigus no ulceration takes place, and the scabs are thin and flimsy. It sometimes happens in ecthyma, that the cuticle, elevated by a purulent collection, forms a sort of bleb; but here the fluid is purulent, and the brown spot in the middle of the cuticular elevation indicates the ecthymous nature of the disease. In horses, the vesicles are small compared to the blebs of pemphigus, and are involved in clusters in the midst of an inflamed patch. The marks which the bullæ of pemphigus leave behind them have also something peculiar, which, to the practised eye, shows the nature of the disease which has produced them.

Treatment. Rest, abstinence, and other gentle antiphlogistic measures are sufficient in almost all cases of acute pemphigus. Venesection is very rarely necessary.

In chronic pemphigus the modified antiphlogistic treatment should also be employed at the outset; but diluent and acidulated drinks, a few tepid baths, and afterwards the alkaline bath, are also to be prescribed. Emollient applications and opium, exhibited in one or other of its forms, will relieve the pain and sleeplessness. Concomitant diseases must, at the same time, be sedulously watched, and treated according to the usual methods, without regard to the cutaneous affection. When chronic pemphigus resists these measures, especially when the habit appears cachectic and debilitated, light nutritious animal food, given with all due precaution, a little old and generous wine, and the decoction of bark with or without sulphuric acid, will have an excellent effect. This tonic treatment is not adapted to the aged with worn-out constitutions only: we have seen many young persons, with feeble powers, derive great benefit from it.

RUPIA.

Syn.—*Ulcus atonicum.*

Rupia (ῥύπος, *sordes*) is characterised by numerous flattish isolated bullæ, containing a fluid sometimes serous, sometimes purulent, often blackish, which are followed by thick crusts, and ulcerations of various depth. As Bateman and Biett have already remarked, it has often a great resemblance to ecthyma.

This disease attacks particularly the lower extremities, sometimes the loins, the buttocks, or other parts. Its duration is commonly protracted, and the number of bullæ small.

Rupia simplex is the most simple form of the disease: it makes its appearance, without previous inflammation, by one or two blebs of the size of a shilling, containing at first transparent serum, which soon grows turbid and purulent. The bleb becomes flaccid, and its contents increase in consistence, and harden ultimately into a deep brown-coloured scab, rough and rugged on the surface, thickest and most prominent in the middle, and adherent by its edge to the surrounding cuticle, which is slightly elevated at that point. On its detachment, the part of the skin covered by it is found superficially ulcerated: this sore usually heals rapidly, though it sometimes remains open for a time, being alternately free from, and covered with a scab. After cicatrisation, a deep red mark continues for a time to indicate the place it occupied. This eruption often succeeds small-pox, measles, and scarlatina, and frequently accompanies ecthymous eruptions.

Rupia prominens is distinguished by the greater size of the bullæ, the greater thickness of the scab, and the depth of the ulceration. The blebs are here soon followed by rough, dark-coloured scabs, which continue to increase for a time both in breadth and thickness. The bleb and scab are always surrounded by an in-

flammatory areola, several lines in width, from which the cuticle is raised by successive effusions of purulent and bloody serum, that dries and adheres to the original scab: this extends by the gradual advancement of the red border or areola, upon which a new scab arises, raising the concretion above it. This process may go on for a week; and, by successive additions, the primitive scab increases both in width and thickness, and at last acquires the size and very much the shape and general appearance of the external surface of a small limpet or oyster-shell. These scabs, though superficial, often adhere for a long time; and though they are sometimes easily detached, in general their removal is effected with great difficulty from the subjacent surface which is ulcerated: in some cases the scabs are reproduced; in others the sores, though very deep and of a bad character, remain open, and resist every means tried for their cure. When the sore is at length cicatrised, livid or dark-coloured marks remain for a long time. This variety is almost entirely confined to the lower extremities.

Rupia escharotica commonly occurs only in children of debilitated habits, on the loins, thighs, and lower extremities. It commences with livid and slightly raised spots: flattened bullæ of an irregular shape, surrounded by a dark red areola, soon form. The contained fluid grows thick and black; and when blebs burst, the exposed surface presents a painful excoriation, which soon degenerates into a foul ill-conditioned ulcer, secreting an unhealthy fetid ichor, spreading both in depth and in width. Successive bullæ appear, and go through a similar course. The cicatrisation is always slow and protracted. The child's health becomes much deranged, and if the disease be extensive, it may prove fatal.

Diagnosis. The peculiar form of the scab, as well as the deep ulcerations which follow, distinguish rupia from pemphigus. The same characters distinguish it from ecthyma, although sometimes here and there an ecthymous pustule has a great resemblance to acute rupia. Excepting rupia escharotica, the disease, although tedious and intractable, is never dangerous.

Treatment. The general indications are to give strength and tone to the system when it is debilitated, by bark, sarsaparilla, and nutritious diet. The scabs may be detached by fomentations and emollient poultices, and a few alkaline baths will generally promote the healing of ulcerations in slight cases.

When a lotion containing red wine and honey fails in effecting this desirable object, the nitrate of silver may be applied, or the nitrate of mercury, which in some cases answers better. In the extensive ulcerations which so often follow rupia prominens, these measures are seldom sufficient. Emollient applications relieve the pain, but do not abate the surrounding inflammation or promote the healing of the ulcers. It is necessary to induce a more healthy action in the diseased surface by the free application of the nitrate of silver, or of diluted nitric or hydrochloric acids. In obstinate cases the concentrated acids may be employed. We have seen the ointment of the proto-ioduret or the deuto-ioduret of mercury used with great success by M. Biett.

In the rupia escharotica, emollient topical remedies and saline diaphoretics are to be prescribed in the early stage. Tonics, such as the decoction of bark or quinine with wine, are prejudicial in the beginning.

ECTHYMA.

Syn. — *Phlyzacia; Agria; Scabies fera; Furunculi atonici.*

Ecthyma is characterised by large round pustules, generally distinct, seated upon an inflamed hard base, and succeeded by thick brown scabs, which, on being detached, leave dark-red stains, and sometimes slight superficial cicatrices.

This disease occurs at all ages: bad food, misery, neglect of cleanliness, are its predisposing causes; it frequently follows small-pox, measles, scarlatina,

scabies, &c., and irritating applications or frictions often produce it. It appears most frequently on the extremities, shoulders, and buttocks.

Ecthyma is sometimes partial and local, running through all its stages in one point: its duration in this case is one or two weeks; or it may be general, showing itself by successive eruptions on every part of the skin, and continuing for weeks and months. When the disease is limited, the eruption may appear at once, but generally the pustules show themselves in successive crops.

Ecthyma appears in the form of circumscribed, hard, raised, red spots, which in a few days acquire various sizes, with inflamed base and the formation of pus in their apex. These pustules are commonly distinct, and form irregular groups, their size varying from that of a pea to that of a shilling and beyond. The pus in some cases forms quickly, in others slowly: sometimes there is very little of it, the base being large and inflamed; in other cases, and especially when it occurs on the hands and feet, there is a good deal, and the cuticle is raised all over the pustule, so as to give it the appearance of a bleb with a central spot. Very violent smarting pain sometimes accompanies the eruption. In three or four days, the purulent matter dries up and forms thickish brown scabs, which fall off in eight or ten days, leaving red points of slight cicatrices when ulceration has taken place beneath.

In children of weakly constitution, badly fed, and especially when convalescing from bowel complaints with distended abdomen, ecthyma frequently occurs (*ecthyma infantile*, Willan). The size of the pustules is very irregular, some being very small, and others very large: the latter sometimes suppurate, and are followed by ulceration; but often, after threatening suppuration, they slowly disappear by cuticular desquamation.

The *ecthyma cachecticum* (Willan) bears a great resemblance to rupia, and attacks principally the legs of aged and cachectic persons who have lived intemperately.

Diagnosis. The size of the pustules of ecthyma, their manner of development, and the extent of inflammation at their base, are generally sufficient to distinguish it from other pustular affections, such as acne, impetigo, mentagra, porrigo, and equinia. The latter, however, in its most simple form, may require some attention to prevent its being confounded with ecthyma. Due attention to antecedent and concomitant symptoms will always prevent it from being mistaken for the pustular form of syphilitic eruptions; the dark red colour of ecthyma will never be confounded by a practised eye with the red coppery hue of the latter. Ecthymous pustules frequently occur in scabies, and a knowledge of this circumstance will always prevent the two diseases from being confounded. Ecthyma is distinguished from furuncle or boil in its mode of development, the surface being first attacked, and the inflammation extending to the deeper tissues; in furuncle, on the contrary, the irritation commences in the subcutaneous cellular membrane, and spreads to the cutis. Furuncle is characterised by the formation of a slough in its centre, around which a very small quantity of pus only is formed; the pustules of ecthyma never contain sloughy cores, but are almost from the first distended with purulent matter.

Treatment. When the disease is not severe, rest, tepid baths, and the use of gentle aperients generally prove sufficient. It must be very severe to require venesection. But when ecthyma assumes the chronic form, lasting several weeks, and occurring in subjects with broken-down constitutions, or debilitated by previous illness, a gently-tonic plan must be pursued, viz. good air, wholesome food, alkaline baths, or sea baths and sea air with due precautions. When the disease occurs under such circumstances in infants the nurse should be changed. As to the local treatment, so long as the pustules or succeeding sores are irritable, emollient applications are alone to be employed. To promote the cicatrisation of ecthymatous ulcers, however, it is often necessary to touch them with the nitrate of silver or sulphate of copper at proper intervals, or to use a lotion containing the diluted hydrochloric acid.

IMPETIGO.

Syn. — *Crusted Tetter; Dartre crustacée; Running Tetter; Cowrap; Lèpre humide; Melitagre.*

The impetigo, or running tetter, is a non-contagious disease of the skin, characterised by the eruption of minute pustules, distinct or grouped in clusters, which break, the fluid forming yellowish, thick, rough, prominent incrustations.

The pustules of impetigo are often collected in clusters, forming circumscribed patches of various figure and extent (*Impetigo figurata*, Willan), which are usually smaller and more circular on the upper, and larger, oval and irregular on the lower extremities. When, instead of being clustered together, the pustules are dispersed without any regular order, the term *impetigo sparsa* is given. Between these two varieties there are many intermediate degrees: each may assume the acute or chronic form.

The *impetigo figurata* (Syn. — *Porrigo favosa; Porrigo larvalis; Tinea granulata; Tinea mucosa; Teigne; Crusta lactea; Mentagra Infantum; Dartre crustacée flavescente*) occurs most frequently on the face, and especially on the cheeks in children during dentition; and also in young persons, of both sexes, of lymphatic temperament. It is seen most commonly in spring, and some individuals are periodically affected by it at that season. Little or no constitutional disturbance precedes its appearance. The eruption consists at first of one or several distinct red patches, on which numerous small yellow pustules, nearly confluent, and attended with much itching, soon appear. When the eruption is severe, a sort of erysipelatous inflammation precedes and accompanies it. The pain is scalding, and the itching intolerable. The pustules, which are very little raised above the skin, are of short duration: they burst within thirty-six to seventy-two hours, and discharge a quantity of purulent fluid, part of which soon dries into yellow, friable, semi-transparent incrustations of various thickness, not unlike a layer of concrete honey. The discharge continues to ooze from under the scab, which grows thicker, and, when detached, exhibits a red inflamed surface studded with numerous minute pores, which secrete an ichorous discharge. Around the clusters several isolated pustules may be seen, some containing pus: on others the fluid just oozing is scarcely concreted.

If the disease be not kept up by a succession of pustular eruptions, it continues in this crusted state for two, three, or four weeks, when the discharge diminishes, the crusts fall off irregularly, leaving a surface red, shining, and very tender, which is ready on the slightest irritation to break out again. On the extremities the incrustations of impetigo figurata are much thicker than on the face, and of a green or brownish-yellow colour; and when they become detached, others form by the desiccation of the discharged fluid.

A variety of impetigo figurata is that which occurs in infants at the breast and during the period of dentition, and which has been termed *crustea lactea, tinea muciflua*, or, from the mask which appears to cover the whole face, *porrigo larvalis.* The eruption here is merely impetiginous, and follows the same course as in impetigo figurata. The same eruption may also occupy the hairy scalp, the pustules being sometimes distinct, sometimes separated: they are of a pale yellow, and each pustule seems traversed by a hair: they are generally very small, but in some cases large and flat; they cause much itching, and discharge in great abundance a viscid, semi-opaque, pale straw-coloured fluid, which moistens the hair, and afterwards forms thick, dry, brown crusts, covering the scalp and matting the hair. These incrustations assume different appearances, according to which they are distinguished by particular names. When they are moist, and in irregular masses not unlike honeycomb, the disease has been termed *porrigo favosa* (very unlike the pustular disease to which we have given this name); when they are dry, irregular, rugged, and granulated, *tinea granulata.* In all these regions *impetigo figurata* may assume the chronic type;

but it is to be observed, that successive eruptions do not appear in these large chronic inflamed surfaces: only a few come out here and there, especially towards the circumference. In these cases the deeper layers of the skin are inflamed, and much thickened. In some instances no pustules are to be found; in others the crusts acquire considerable thickness (*impetigo scabida*), which may encase one or more of the limbs.

Impetigo sparsa goes through the same process as the preceding; the pustules are not clustered in circumscribed patches, and it occurs more frequently on the lower extremities than the former. It is also apt to appear in the autumn, whilst the clustered variety is more common in spring. The crusts that form are rough, thick, friable, and differ essentially from the flaky scab of eczema. They soon cover the whole diseased surface, on which, when the first fall off, new incrustations form by the desiccation of the sero-purulent fluid which it discharges. Impetigo sparsa may continue for months and even years; and the thick, yellow, scabby crusts encasing the limb (leg or arm), the motion of the part is impeded, the skin much thickened, and sometimes, as in lepra and psoriasis, the incrustation extends to the fingers and toes, destroying the nails, those which are regenerated, being thick-notched, are irregular.

Impetigo is frequently caused by outward irritating applications, such as manipulating with brown sugar, chalk, metallic filings, &c. It appears principally in spring and autumn, and in children during dentition. Individuals with fair complexions, lymphatic temperament, and fine skin, are often attacked by it. Acute grief or fear has sometimes brought it on very suddenly. It may be complicated with other eruptions, especially lichen.

Diagnosis. The smallness of the impetiginous pustules sufficiently distinguishes them from ecthyma. The brownish yellow colour of the incrustations and their being continuous with the copiousness of the discharge, prevent impetigo from being confounded with mentagra, in which the scabs are drier, of a deeper brown, and are not renewed by the discharge of fluid from the surface, but by successive eruptions. In impetigo the eruption is pustular from the first: eczema impetiginodes is not. Impetigo is readily distinguished from porrigo in its not being contagious, and in the form and character of its incrustations, which are moist, rugous, and continuous,— not of a whitish yellow colour, dry, umbilicated, and moulded, like those of true porrigo. In impetiginous eruptions of the hairy scalp, when proper cleanliness is not observed, the appearance of thick incrustations, matted with the hair, often swarming with lice, and exhaling a most fetid smell, gives the disease a character of greater severity than ordinary impetigo. The scaly cuticular incrustations of squamous diseases are easily distinguished from impetigo by the pustules, incrustations, and copious discharge of the latter.

Treatment. In the milder forms of acute impetigo, the antiphlogistic regimen and emollient tepid fomentations, as of tepid milk, decoction of bran, or marsh mallow root and poppy heads, emulsion of sweet almonds, mucilage of linseed, and afterwards light dressings with the Ung. Oxid. Zinci, or Plumbi Superacet., are to be employed. In the more severe, local and even general abstractions of blood are often necessary: emollient washes should be applied at first; they may be afterwards rendered alkaline. Gentle aperient medicines and tepid baths are also very useful. In impetigo of the scalp, the hair must be cut close, or the scalp shaved, and unremitting attention paid to cleanliness. If the disease be obstinate, the vapour douche, gently and properly used, has often very good effects, but it must not be employed too early: purgatives, and drinks acidulated with the sulphuric acid, and alkaline baths or the suphurous water bath, may also be prescribed.

When impetigo assumes a decidedly chronic type, attention should be paid to ascertain if the continuance of the disease be not owing to the prolonged use of irritating remedies. If so, tepid baths rendered slightly alkaline, and emollient local applications, may prove useful. If this is not the case, the vapour bath, and washing the diseased surfaces with diluted hydrochloric, sulphuric, or

nitric acid (about a drachm of the acid to an ounce or more of water), should be employed. The lotion may be applied with a feather, which is passed over the surface, and pure water poured immediately over it, in case the acid be too strong. Obstinate patches are often much improved by the Ung. Hydr. Nit. Should all these methods prove inefficient, the arsenical preparations (Pearson's or Fowler's solution) must be cautiously employed.

In the treatment of impetigo, and especially of that of the scalp in children, it is worthy of consideration whether it may not be more useful to the constitution of the child to suspend curative measures for some time, especially when there is great discharge, and the appearance of the eruption seems to correspond with the disappearance of other symptoms.

ACNE.

Syn.—*Varus; Gutta rosea or rosacea; Couperose; Bacchia rosacea; Dartre pustuleuse miliaire; Dartre pustuleuse disseminée; Dartre pustuleuse couperose; Copper-nose.*

Acne is a pustular affection of the skin, generally chronic, characterised by small isolated pustules supported on a deep red base, apparently seated in and around sebaceous follicles, and often succeeded by small circumscribed livid-red indolent tumours, that disappear slowly, leaving indelible though very minute cicatrices. This disease is very common in young people, whence it derives its name ἄκνη or ἀκμη, *maturitas*, vigour. It is generally met with between the ages of fifteen and forty, both sexes being equally liable to it. The parts usually affected are, the sides of the face, the forehead, shoulders, and upper part of the bosom and back; it never occurs on the limbs, but sometimes in severe cases a few pustules show themselves on the back of the arms. Willan and Bateman describe four varieties of this eruption—*Acne simplex, punctata, indurata*, and *rosacea*. To these Biett has added the *acne sebacea*. All these varieties are sometimes met with in the same individual. *Acne simplex* is generally seated on the forehead, or about the whiskers, and on the back and shoulders. The pustules appear successively one after the other in the form of small, red, hard, inflamed spots, which become slowly pustular, the base being surrounded by a red areola. They appear without any constitutional symptoms, and usually without pain or local heat. Sometimes several come out on the forehead simultaneously. The formation of pus takes place about the eighth day, or sooner; it is thin, and usually mixed with a thick sebaceous matter. Thin scales generally form, which, on falling off, leave a dark red raised mark that slowly disappears. In some points the redness and induration remain, and form small tumours which resemble those of the acne indurata. When the pustules of acne simplex are intermixed with a considerable number of black circular points, which are the external orifices of the follicles filled with concrete sebaceous matter, and are often converted into pustules, the disease has a peculiar appearance, and has been termed *acne punctata*. Acne simplex is sometimes of short duration, but it often disappears and recurs at short intervals.

Acne indurata. When the simple form of the disease does not pass off, or when the inflammation is deeper and more general, the skin and even the subcutaneous membrane becomes thickened around the pustules, and forms hard, indolent tumours of a dark dusky colour. In this state the disease is termed *acne indurata*. The progress of the pustules is always slow, the matter seldom making its way to the surface in less than two or three weeks. This variety is sometimes very trifling in extent, being confined to a few pustules or indurations on the temples, sides of the face, or forehead; but frequently it appears with symptoms of much greater severity. The face is studded with livid red indurated tumours; pustules are crowded between these indurations and on other parts of the face; the skin is hypertrophied and unctuous, and all the

features are distorted in a most unseemly manner. The same aggravated form may attack the back, where it often leaves indelible, small, oblong cicatrices. The duration of this variety is very protracted; and if it disappears at all, it does so very slowly, having a great tendency to return.

The *acne rosacea*, or *gutta rosea*, is confined almost exclusively to the face, and often to the nose and portions of the cheeks adjoining it. This variety commonly occurs among individuals who have attained or have passed the meridian of life, and is often seen on females at a certain critical period. Intemperate habits, hereditary disposition, intense study, are the supposed causes of this variety, which is often combined with disordered functions of the stomach and liver. In those predisposed to acne rosacea, the point of the nose is generally first observed to become unusually red after meals, or after exposure to any exciting causes; the cheeks are often flushed at the same time, and here and there a few pimples appear. This redness by degrees becomes habitual, is increased after taking stimuli, and is paler in the morning. Sometimes it never goes beyond the formation of red patches over the cheeks and nose, with the occasional eruption of yellow pustules in different parts. In many cases however, the skin thickens, the veins of the nose enlarge, the surface is uneven and granulated. Small indurations and yellow pustules are scattered over the red variegated surface, and the features of the patient undergo considerable change. The nose in some persons becomes swollen and of a fiery red colour, and in advanced life it sometimes enlarges to an enormous size, the nostrils being distended and patulous, or the alæ fissured, as it were, and divided into several separate lobes. At an advanced period of life, the acne rosacea becomes more dark and livid.

The *acne sebacea* was first noticed by Biett; in this variety, the inflammation appears to be seated in the sebaceous follicles alone, the surrounding cutaneous tissue remaining unaltered. The skin does not present at first any change of colour but the affected parts become oily and greasy. The secretion increases, and the sebaceous matter which exudes upon the surface of the skin concretes and forms a sort of squamous incrustation of various extent. The skin beneath is red and irritated, and the dilated ducts of the follicles are distinctly seen. Sometimes the inflammation affects almost the whole cutaneous surface; and when it is very acute, the sebaceous matter, which is secreted in abundance, is very similar to the sero-purulent fluid of eczema impetiginodes, and even the incrustations partake of the similitude.

Diagnosis. The pustules of ecthyma, with which acne appears often to have been confounded, are much broader, and covered with thick adherent scabs, which are never seen in acne; there are, moreover, no indurations as in acne. The thick incrustations, and the continual discharge from the diseased surface, distinguish impetigo from every form of acne. The indurations of syphilitic origin which occur on the face are more broad, flat, and shining, and generally ulcerated on the top; while their peculiar red copper hue is very characteristic. Acne has been sometimes mistaken for incipient lupus, for noli me tangere, and even for ichthyosis.

Treatment. Acne simplex usually disappears as the period of manhood is approached; but acne indurata proves more intractable, and often continues for many years. Acne rosacea is always an obstinate disorder, and in many cases incurable. When acne simplex is extensive, the diet should be restricted, and animal food and stimulants avoided. If the individual be young and plethoric, bloodletting, either local or general, may be necessary. The applications should be emollient, consisting of emulsion of bitter almonds, decoction of bran or linseed, or of quince seeds, tepid milk, &c. In obstinate cases of acne simplex, a stimulating alkaline lotion, such as a solution of the subcarbonate of potash in the proportion of a scruple or more to an ounce of distilled water, or a mixture of alcohol and rose or lavender water, in the proportion of an eighth, fourth, or half of the former, may be employed: the application may be made more powerful by adding one or two grains of corrosive sublimate

to each ounce of the lotion. Gowland's lotion, which is almost the same preparation, or washes with sulphurous waters, may also be tried, the one being employed if the others fail. These stimulating washes should be applied in the evening before retiring to rest. Aperients are necessary, more especially when there is a determination of blood to the head. The chronic indurations may be treated by the measures detailed in the succeeding variety.

Acne indurata requires more active measures, such as frictions on the indurated parts and pustules with the ointment of the proto-chloruret of mercury, or with that of the ioduret of sulphur, which in Biett's hands has effected many cures. General vapour baths, the vapour douche, and the cold sulphurous water douche, are of great service. Blisters and even cauterisations may, in very obstinate cases, be necessary. The external and internal use of sulphurous waters is often very beneficial; in baths their utility is questionable. Should determination of the blood to the head occur during the treatment, local bleeding and gentle aperitives should be employed according to circumstances. Drastic purgatives are not only useless but hurtful.

In acne rosacea, the greatest attention must be paid to the diet: animal food, salt water fish, and alcoholic, vinous, and fermented liquors, should be forbidden. Still it must not be forgotten, that the disease may appear in persons who live abstemiously, and in the gutta rosacea *hydropotarum*, a little good wine and gentle stimulants would be more conducive to health than a severe regimen. Besides the dietetic regimen, the treatment of acne rosacea should consist of local bleeding by leeches behind the ears, washes with bread steeped in fresh asses' milk applied cold, cold decoctions of lettuce, emulsion of bitter almonds, tepid baths, &c. The muriatic acid pediluvium is often a useful adjuvant. If indurations appear and are obstinate, resolvent frictions or the vapour douche should be employed; this last is of great service after emollient local applications in the acne sebacea, and ought to be followed by the use of some more stimulant wash.

MENTAGRA, OR SYCOSIS.

Syn. — *Chin welk; Dartre pustuleuse; Mentagra; Varus mentagra.*

MENTAGRA is characterised by the eruption of small acuminated pustules, very similar to those of acne, on the parts occupied by the beard, such as the chin, upper lip, and sub-maxillary region.

This disease commonly appears after having been preceded for several months by minor eruptions, which have soon disappeared. Mentagra, when severe, is preceded by redness and a feeling of tension, heat, and itching in the parts which are about to be affected. Bright red spots soon appear on the inflamed surface, and become distinctly pustular in two or three days; a yellowish fluid exudes when they are punctured, but is not mixed, as in acne, with sebaceous matter. These pustules are of a pale yellow colour, and generally acuminated and distinct, but when grouped in clusters they are elevated on small, hard, red tumours; and when successive eruptions appear, the skin and even the subtegumental membrane become thickened, the part affected presenting a mamillated appearance, covered with pustules either isolated or in clusters, and here and there, with thick brown crusts. Successive crops of pustules keep up the disease, which often lasts for years, although it may disappear in a much shorter period.

Mentagra occurs in the prime of life, and often first appears or returns in the spring and autumn. It was considered by the ancients to be contagious; but that opinion appears unfounded. Cooks, founders, smiths, who are much exposed to strong heat, especially when given to drinking, appear very subject to this disease. But still, individuals in the better classes of society, and those of sober habits, are equally liable to it. Females are rarely affected.

Diagnosis. Their smaller size, thinner crusts, and the tubercular indurations, distinguish the pustules of mentagra from those of ecthyma. The eruption of impetigo figurata is clustered, not scattered, and not acuminated like that of mentagra; and its incrustations are thicker, more extensive, more continuous, and followed by a copious discharge of fluid. Besides, the lobulated tuberculations of mentagra when severe are not observed in impetigo. Syphilitic tubercles are rarely observed on the chin and upper lip; they are commonly seated on the alæ nasi, forehead, and corners of the lips: besides numerous other local and constitutional symptoms sufficiently distinguish them from mentagra. The pustules of this disease differ from those of acne by their seat, which is not in the sebaceous follicle, but rather around the secreting follicle of the beard.

Treatment. Antiphlogistic regimen, whey, or some mild diluent, local and even general bloodletting, poultices of decoction of marsh-mallow root, and potato flour laid on tepid or other emollient applications, and gentle aperitives, are the most useful measures at first. But in chronic and indurated mentagra, the vapour douche, and inunction with the resolvent ointments already mentioned in acne, are necessary. In obstinate cases, chalybeates, or the muriate of gold in doses of a quarter of a grain applied to the tongue, have sometimes succeeded. During the whole course of the disease the use of the razor must be laid aside, and the beard clipped with flat curved scissors.

PORRIGO.

The difficulties encountered in the study of the pustular diseases of the hairy scalp have been greatly increased by the descriptions given by Willan and Bateman, under the title of porrigo and porriginous eruptions. They have described porrigo as a contagious pustule, and at the same tlme, and under the same head, various eruptions, many not contagious, are jumbled together. Biett, in his valuable oral lessons delivered for the last twenty years, has unravelled the mystery; it is due to this eminent dermatologist to make this announcement, as others have not scrupled to publish as their own opinion the statements he delivered publicly many years ago. The porrigo *lupinosa* and porrigo *scutulata*, as Biett rightly observes, are alone contagious diseases, with peculiarly formed pustular eruptions. The others, termed by Willan porrigo *favosa*, *P. larvalis*, *P. decalvens*, *P. furfurans*, are merely impetiginous or squamous affections of the hairy scalp. The denomination *favosa* was given by Biett to one of the varieties of contagious porrigo, on account of the remarkable honeyed yellow colour of the incrustations, much more striking than in any other; and it corresponded also with the name *tinea favosa*, given by Alibert to that disease.

I. Porrigo Favosa.

Syn. — *Tinea*; *Teigne; Favus; Porrigo lupinosa; Tinea favosa* (Alibert); *Tinea rugosa.*

Porrigo Favosa (the *P. lupinosa* of Willan) is characterised by the eruption of small, flat, yellow, umbilicated, deeply seated pustules, distinct or clustered, which soon concrete and form bright yellow umbilicated scabs. A certain degree of itching accompanies the appearance, but the skin is very little inflamed, except when the pustules are isolated, and then the base is sometimes red and elevated. A single hair generally passes through the centre of each pustule. Their contents are at first fluid, but very soon harden into bright yellow incrustations, which increase slowly in size, the cupping of the surface becoming more and more apparent till they attain a diameter of three or four lines, or even that of an inch. When the pustules come out in clusters, the scabs blend, and become united on their edges, so as to form continuous yellow incrustations of various sizes, on the surface of which the honeycomb depressions, each cor-

responding to a primitive pustule, are readily distinguished. The colour of the recent scabs is bright yellow, but they afterwards become much thicker and whitish, and, getting very dry and brittle, split in all directions.

If left to themselves, the scabs may remain adherent for years; but in these cases the subjacent teguments sometimes become the seat of ulcerative inflammation, which may penetrate to the periosteum, and even to the skull. When the incrustations are detached by means of poultices, &c. slight erosions of the cutis are found beneath, which pour out a red yellowish ichor, drying in irregular scabs, but without the characteristic depressions of the primitive favous crusts, each umbilicated scab being the result of the development of a fresh pustule. The hair covering the affected parts is, from the very commencement of the disease, easily pulled out by the roots; but if it be of some duration, the hair falls off spontaneously, and bald, smooth, shining patches indicate the seat of the primitive eruption. When the disease has been arrested, the hair grows again thin and woolly at first, and is generally weaker and lighter in colour than before, though in some instances it has the same appearances as the hair on the sound portions of the scalp. The itching of porrigo favosa is generally annoying; and the smell from the surface of the head, which is sometimes covered with a sort of thick crusted cap, very disagreeable. Small subcutaneous abscesses may sometimes appear, with tumefaction of the lymphatic glands of the neck. Porrigo favosa appears occasionally on other regions of the body besides the scalp, particularly the shoulders, arms, hands, forearms, thighs, legs, scrotum, &c. The disease is most undoubtedly contagious; but not necessarily so. Persons of all ages are attacked, but more particularly children from six to ten years of age. A scrofulous or lymphatic habit of body, improper food, and residence in low damp situations, have sometimes appeared evident occasional causes. But its development is generally traced to contagion; and then children of weakly, and those of the most robust constitutions are indiscriminately affected. We have seen several favous pustules appear, without any apparent cause, on the forearm of a female who had been brought to bed three or four days before.

Diagnosis. The peculiar appearance of the pustules and incrustations sufficiently distinguishes this disease from every other pustular eruption, excepting porrigo scutulata, the pustules of which are equally small, yellow, and umbilicated, but they are disposed in annular patches. The incrustations following the impetiginous and vesicular eruptions of the scalp, however abundant they may be, never present the honeycomb appearance of the favous scab: those diseases, moreover, do not cause loss of the hair.

Treatment. Porrigo favosa is almost invariably a very obstinate disease, and often continues for months, and even for years, in spite of the best directed curative means. The first step to be taken is to cleanse the scalp completely and to free its surface from incrustations; this may be effected by continued application of tepid emollient fomentations, poultices, soapy and alkaline washes, &c. The hair must be clipped close with scissors. Throughout the whole treatment the most unceasing attention must be paid to the gentle removal of the incrustations and dead hair; the latter, if they do not fall off, are easily removed by small forceps, or by the use of some alkaline depilatory ointment. This point having been obtained, and after existing inflammation has been subdued by emollient applications, we must endeavour to obtain cicatrisation of the affected surface. Internal remedies are generally useless, unless the state of the constitution should require some gentle tonic, such as infusion of gentian root, taraxicum, or hops, &c. When the disease has existed some time, blisters on the arm, and gentle aperient medicine, may be advantageously employed. When it is recent, and there are few pustules, it has been immediately arrested by cauterising with the nitrate of silver the slight erosions of the skin, after the favous scab has been detached. But when the disease is of long duration, and of some extent, the appropriate means are alkaline and sulphurous washes, and acidulous lotions. The alkaline washes are made stronger or weaker according to circumstances. Ten or twelve grains of the

potassa fusa in an ounce of distilled water, or one or two drachms of subcarbonate of potash dissolved in a pint of tepid water, are the best alkaline applications. The first lotion should be applied for a short time only; and the latter by means of moistened linen constantly to the part. Alkaline ointments (one drachm of subcarbonate of potash to an ounce of fresh axunge) are also useful, and may be rubbed on gently after the wash. The ointment may be omitted if it appear to soften the parts too much. Lotions of the sulphuret of potash, containing one, two, or three drachms to a pound of distilled water, with an ounce of alcohol, may be substituted for the alkaline washes, should these prove inefficient. Gentle sulphurous douches every morning are also of great service. The acidulated washes consist of the muriatic, nitric, or sulphuric acids more or less diluted.

Solutions of the sulphate of zinc, of copper, of the nitrate of silver, or of the deuto-chloruret of mercury, have been sometimes used with the best effects. The Unguentum Nitratis Hydrargyri, in some cases, improves the condition of the affected parts. Biett has lately employed, in porrigo favosa, an ointment of the ioduret of sulphur, which merits the greatest confidence. We have seen it, in long-standing cases, greatly improve the state of the diseased skin, prevent the formation of fresh pustules, and cause the hair to be reproduced with the same appearances as that of the sound portions of the scalp.

During the treatment, tepid baths, and sometimes sulphurous water baths, are useful adjuvants. The greatest care is to be taken to prevent the fluid which is exhaled from the excoriations being carried over the adjacent parts, the contagious nature of this fluid having certainly some influence on the obstinate reappearance of the favous pustules; and this is only to be attained by great cleanliness, and the repeated use of weak alkaline washes. Should the irritation be intense, all stimulant applications ought to be suspended, and emollients substituted.

In very obstinate cases, the cauterisation of the diseased surfaces, with some concentrated or rather diluted acid, has effected a cure. The acid should be passed over quickly with a feather, and water poured immediately on the parts before the action of the caustic becomes too deep. We have lately seen kreosote succeed when many other means had failed. The diseased parts are to be touched with a small hair pencil dipped in kreosote, and dressings with an ointment of a scruple of kreosote to an ounce of axunge afterwards applied.

II. Porrigo Scutulata.

Syn.—*Ringworm; Tinea annularis.*

Porrigo Scutulata is a chronic, contagious, pustular disease, generally affecting the scalp, and assuming the annular form: it is very rarely met with in other regions of the body, excepting the forehead and the neck.

The disease appears in the shape of one or more circular red patches, upon which numerous minute, deeply-seated, yellow pustules appear. These pustules are crowded together, but more especially in the circumference of the patches: they are small, circular, umbilicated, and commonly traversed by a hair, of a less bright yellow than those of porrigo favosa: and their eruption, like that of the erythemous patch which precedes them, is attended with intense itching. The fluid they contain dries up very soon, and forms a small cupped scab, which adheres by its edges to those adjoining, and thus a continuous incrustation of the form and dimensions of the original patch is produced; but these incrustations do not retain the remarkable honeycomb appearance of the crusts of porrigo favosa. Successive eruptions of pustules, appearing in the circumference of the circular patches, enlarge their diameter; and when these are very numerous, the whole or a large portion of the scalp may be covered with a thick, continuous, whitish incrustation, around which quarters or halves of the primitive circular blotches are seen. In these cases, there is no hair, except around this scabby cap, where

the few remaining hairs form a sort of crown. Portions of the scalp are frequently covered by circular patches, some of one or two inches in diameter, each showing the disease in a more or less advanced stage, with here and there a white and shining space entirely bald. The intervening portions of integument are always covered, to a greater or less extent, with a furfuraceous desquamation.

This disease sometimes appears spontaneously in children, and persons of impaired constitutions, poorly and badly fed; but the more ordinary cause is contagion, spreading rapidly among children, who make use of the same comb, hair-brush, towel, &c.: it then affects the strongest and most healthy, and the weakly indiscriminately.

Diagnosis. The contagious nature and peculiar form of the pustules, the colour and shape of the incrustations, and the baldness it occasions, sufficiently distinguish porrigo scutulata from all other cutaneous diseases. Its regular annular arrangement differs greatly from the irregular clusters of porrigo favosa; and, at a more advanced period, the scab does not show the honeycomb appearance of the latter. Impetigo figurata of the scalp differs greatly in the moist nature of the discharge, which dries gradually into a scab. Porrigo scutulata may always be discriminated from herpes circinnatus, and the patches of squamous lepra in the healing stage, by attending to the progress of those diseases, and to the manner in which they come out.

Treatment. Porrigo scutulata is always a very obstinate disease, and may last for years. For its treatment we refer to what has been stated already under PORRIGO FAVOSA.

EQUINIA, OR GLANDERS.

THIS denomination has been given by Dr. Elliotson to a dangerous contagious disorder, accompanied with pustular eruption, and which arises from inoculation with certain diseased fluids generated in the horse: the term *Vaccinia* having been applied to the eruption produced by the infection of the human constitution with the virus of cow-pox. In order to indicate the source from whence the disease derives its origin, Dr. Elliotson has very justly applied the term equinia to the disease proceeding from the glandered horse. The only analogy, however, which might authorise this denomination, is its being derived from the horse; for otherwise, the one (vaccinia) is a very mild and highly beneficial distemper; whilst the other (equinia) is a dreadful scourge. Besides, we find another eruptive disease also proceeding from morbid fluids generated in the horse, and which would deserve, with still greater justice, the name of equinia. This is the peculiar pustular eruption mentioned by Dr. Jenner, who supposed it, when inoculated upon the udder of the cow by the persons employed in milking them, to be the primary source of vaccinia. This eruption is not at all uncommon among coachmen, stable-boys, farriers, and other persons who dress the heels of horses when affected by the disease called *grease.* The horse, indeed, it is well known, is subject to an inflammation and swelling in the heels (the grease), from which, at a certain period of the affection, a very acrid thin matter issues, which, when applied to any slight abrasion of the hands, gives rise to a pustular affection of the skin.

We consider, therefore, that we are warranted in including under equinia two diseases in the human species, proceeding from the horse, and accompanied by pustular eruptions: the one *equinia mitis,* a mild distemper contracted from horses affected with grease; the other *equinia glandulosa,* a dangerous and commonly fatal disease, communicated to the human species, either in the acute or chronic form, from the glandered horse. Glanders, which attacks not only the horse, but also the ass and the mule, according to veterinarians, occurs under two forms, *glanders* and *farcy glanders:* the former affecting the pituitary membrane, frontal sinus, and parts adjoining, and giving rise to a profuse offensive discharge from the nostrils, with pustular eruptions on various

parts, or to small tumours, which soon suppurate and ulcerate, being at the same time attended by symptoms of malignant fever, and by gangrene of various parts: the latter, or farcy glanders, is the same disease appearing in the shape of small tumours about the legs, lips, face, neck, or other parts of the horse, sometimes creating little inconvenience, but being frequently numerous, large, painful and rapid in their course; they are at first hard, but soon suppurate and degenerate into foul ulcers. These two varieties are often seen together, the one sometimes preceding the other, and *vice versâ*.

The first account of glanders in the human species appears to have been published in Germany by Dr. Remer (*Hufeland's Journ.*, March, 1822); but Dr. Elliotson more particularly directed attention to this important subject in 1830. The possibility of the transmission of this disease from the horse to man, at first dubious, is now placed beyond doubt, by the subsequent observations of Dr. Elliotson, and others, in England, France, and Germany.

Equinia mitis is produced in the human species by the introduction into the system of a morbid fluid arising from inflammation of the heels of the horse, which is known by the name of the grease. It occurs on the hands of farriers, stable-boys, coachmen, and other persons who dress the heels of horses under grease, in the form of large phlyzacious pustules, principally on the back of the hands. The pustules, which are very similar to those of ecthyma, and elevated, have a red purple swelled base; they are about the size of sixpence, and vary in number: we have always seen several; and it is not probable that each pustule arose upon an abraded point, but that several occurred round the part infected, though it is possible that the morbid matter had been inoculated on various chapped points of the back of the hands. The pustules become purulent about the eighth day, and begin to dry about the tenth or twelfth, forming thick scabs, which leave well-marked cicatrices. Sometimes general symptoms, such as slight shiverings, frequency of pulse, heat of the skin, and disposition to sweat, accompany the eruption.

Dr. Jenner believed, and originally stated, that the acrid secretion arising from inflammation of the heels of the horse affected with grease, and conveyed to the udders and teats of the cows in dairy farms by the servants employed in milking, was the origin of cow-pox, and that it was produced in this way alone. Subsequent experiments made by Woodville, Coleman, and Pearson, proved that cow-pox originated without access of horses; while, on the other hand, it was shown by Pegge, Loy, Saccho, and others, that it could be produced from the heels of the horse: Jenner afterwards modified his views as to the cow-pox being derived exclusively from the horse. We have attempted to inoculate upon the teats and udders of several cows the matter from the pustules of equinia mitis, which occurred on the hands of a farrier; but the experiment did not produce any appearance of cow-pox.

The *treatment* consists merely in rest, with some cooling medicines, and local emollient applications.

Equinia glandulosa. We include the various forms of glanders in the human species under this name, which was first introduced by Dr. Elliotson: the term *glandulosa* indicates its nature, and distinguishes it from equinia mitis. This disease, according to Dr. Elliotson, may appear in the human subject in different forms. 1. In that of simple acute glanders, the disease attacking the nasal cavities and adjoining parts. 2. In that of acute farcy glanders, appearing in various parts in the form of small tumours, which suppurate and give rise to foul ulcers. 3. These varieties may exist separately, or they may be both produced at the same time, or the one may precede the other. 4. Each of these varieties may also occur in a *chronic* form: they may also exist separately or be conjoined. Besides these several varieties, others have been admitted by some authors: thus Rayer distinguishes in the acute form an *ecchymotic* and *gangrenous* and a *pustular* variety. It must not, however, be forgotten that all these varieties constitute one and the same disease; that they are produced by the same specific infection; and that the acute forms are generally met with together. Between the chronic and the acute form, there

are many intermediate grades. The disease may last for several months, and then, suddenly assuming an acute character, the patient is hurried to the grave.

Acute equinia glandulosa commences with symptoms very similar to those of acute rheumatism, for which it has been often mistaken. These symptoms are, constant and severe pains in the joints, sometimes accompanied with swelling, frequent rigors, prostration of strength, depression of spirits, headach, thirst, fever, and irritability of the stomach. There is much heat about the nose and windpipe, and a copious discharge from the nostrils. The nose and surrounding parts soon become swollen, and of a bright red, and afterwards of a livid colour: one or both eyelids are swollen, so as to close the eyes more or less completely. A profuse tenacious mucus, at first of a deep yellow, but afterwards of a bloody or dark sanious appearance, exudes from one or both nostrils, and sometimes from the eyes. The agitation and tremor at this period constitute also a very remarkable symptom. The skin is hot, the pulse frequent, and usually soft and weak; the respiration is rapid and short; the tongue dry, the thirst intense, and the mind incoherent or wandering. Livid patches appear on the sides of the nose, cheeks, or forehead, soon followed by copious sweats, and a gangrenous state of the diseased parts, succeeded by delirium, tremor, and death in a few days. This variety is called acute glanders, because the disease appears to affect solely the pituitary membrane and the surrounding parts, and is seldom, if ever, accompanied with pustules or tumours.

It is certainly not common, for, on examining the cases on record, we find that in more than two thirds of those who died there were pustular eruptions and tumours, being the form of the disease called *farcy glanders*. The eruption, which usually appears about the eighth day, consists in phlyzacious pustules, in livid patches, and in small tumours which arise in different parts of the body. The pustules are round, often umbilicated, and contain a liquid purulent matter, with a little coagulated lymph in the form of a white soft substance, very similar to that contained in variolous pustules, and in the phlyzacious pustules induced by the external application of tartar-emetic; the umbilicated form is, however, far from being constant: they are sometimes confluent on the face, the scalp, and the neck, which parts are more or less swelled and inflamed. The size of the pustules varies between that of a pea and that of a mulberry, to which they often bear a great resemblance in their deep purple colour. Gangrene occasionally occurs in some of these pustules. The eruption is generally accompanied by the appearance of small tumours on different parts of the body: these are more numerous on one side than on the other, and have a shining red appearance, which soon changes to a dark livid brown. At first they are hard and painful, but their surface soon cracks, and discharges a thin acrid sanies. These tumours sometimes mortify; but generally they communicate with deep-seated abscesses formed in and between the muscular parts. They have even been found to communicate with the thoracic cavity by the destruction of the soft parietes; their diameter varies from half an inch to one, two, or even several inches. Other eruptions occasionally appear at the same time; for example, bullæ, filled with a reddish serosity or smaller blebs resembling vesicles, are now and then observed. Dark red or livid patches of various sizes also come out on different parts, and frequently become gangrenous. These eruptions do not appear at once, but in successive crops, sometimes as late as the twentieth day.

The external surface is far from being the only part on which the pustular eruption occurs; for, besides the pituitary membrane and that of the frontal sinuses, which are often studded with them, they also appear on the mouth, tongue, fauces, larynx, and even penetrate as far as the mucous membrane of the intestines.

The general symptoms are great prostration, thirst, frequent tremor and agitation, and delirium. The discharge from the nostrils does not always take place, probably on account of the fluid finding a readier passage down the

pharynx when the patient lies on the back; such, at least, is the opinion of M. Andral. Sometimes, at an early period, the septum nasi is found destroyed, so that a probe passes readily from one nostril to the other. Epistaxis is also occasionally observed. All the cases of acute equinia glandulosa as yet on record have terminated fatally: death is ushered in by the gangrene of various parts, by violent shiverings, great prostration, delirium, quick and indistinct pulse, with profuse diarrhœa.

On examination after death, the nasal cavities are found studded with clusters of small, flat, irregular, white pustules, with irregular ulcerations and mortified surfaces of various extent. The septum nasi is almost always ulcerated, and sometimes perforated, and the nostrils and frontal sinuses contain a dark viscous frothy mucous. On dividing the large livid or gangrenous tumours, the muscles often appear decomposed: they are of a dark colour, exhale a peculiar fetid odour, and contain specks of purulent matter, with which the muscular tissue appears to be infiltrated. White pustular eruptions, such as those found in the nasal cavities, sometimes also exist on the mucous membranes of the small or the large intestines. Between the muscles are also found in many cases deep extensive abscesses communicating with some of the tumours, and the pustules contain a sanious purulent matter mixed with coagulated lymph; whilst the surface of the subjacent corion appears excoriated and corroded. Lymph or pus is sometimes found in some of the articulations.

Chronic equinia glandulosa is not, in general, accompanied by any pustular eruption. It is sometimes confined to one or the other nostril, and is then called *chronic glanders;* or else tumours appear slowly and successively on different parts, and suppurate, constituting what has been termed *chronic farcy glanders.* Sometimes both appear simultaneously in the same individual.

This form is preceded by shivering, weakness, and pain in the limbs. When confined to the nostril, it is characterised by a glutinous and very fetid discharge, the stench being peculiar and very disagreeable; when in a more severe degree, there is suffusion of the eyes, with ulceration of the pituitary membrane, and a copious puriform or sanious discharge. At a later period, sometimes after several months, tumours begin to appear in different parts, and their evolution is accompanied by rigors, nausea, delirium, general febrile disturbances, and frequent slimy evacuations. From this state the patient seldom recovers, but generally gradually sinks.

In the other variety of chronic equinia glandulosa, called *chronic farcy glanders,* the nasal membrane at first remains sound, and small tumours gradually appear about the face, trunk, and limbs: these break, and are followed by an unhealthy discharge, and are attended or followed by glandular enlargement, or by purulent collections in the joints or in various parts of the body. The disease may terminate fatally in this manner; but the nasal affection often comes at a later period.

The *duration* of the acute and chronic equinia glandulosa is very various. In the former, death may occur in a few days; but in the greater number of instances, life has been prolonged beyond the twelfth day, and in some cases to the thirtieth. The chronic variety may last a month only: a few tumours and pustules slowly form, and disappear under curative measures: sometimes ten months have elapsed before the fatal termination occurred.

The *cause* in both the chronic and acute form of equinia is evidently the same, viz. the diseased fluid of the glandered horse; but it yet remains to be discovered why it is acute in one case and chronic in another. It is generally admitted that the application of the matter of glanders upon an abraded surface is necessary to produce the disease. Some observations however tend to show the possibility of contagion without any direct communication, by merely breathing contaminated air. Dr. Elliotson has seen the disease produced in a female who washed the linen of an infected person, and Dr. Gravel mentions two similar cases. M. Ferau has also seen glanders contracted by a son while attending his father, who had become affected by a glandered horse. In all

countries it has been observed that those who have contracted this disease are generally individuals of debilitated constitution and intemperate habits.

It must, however, be mentioned that, according to experiments lately made in France by order of the Government, glanders does not appear to be a very contagious distemper amongst horses. Of one hundred horses exposed to the contagion, only seven or eight were infected; and some twenty years ago, when more than six hundred glandered horses were collected together at Alfort, not one of the persons who had charge of them was in the slightest degree affected.

The *prognosis* is always very unfavourable. The patient has invariably perished. All the acute cases on record, and many of the chronic form, have terminated fatally.

Treatment. It would be a much easier task to say what means might be tried, in equinia glandulosa, than what have been of use. In the acute variety, the excessive thirst may be assuaged by the use of soda-water, or drinks slightly acidulated with the hydrochloric acid. The solutions of the chlorides, or the chloruret of potash, may also be tried, used as gargles, taken internally, or injected into the nostrils. Dr. Elliotson advises turpentine embrocations to be applied externally as warm as they can be endured, and even turpentine to be administered internally in very small frequently-repeated doses.

In the chronic form he has found great benefit from small doses of kreosote, one, two, or three drops a day, in addition to the external application of the same antiseptic to the surface of the ulcers. In a chronic case mentioned by Mr. Travers, which terminated favourably, one of the principal remedies, among others, was the frequent exhibition of emetics. Fumigated or medicated warm baths, or the vapour bath with the fumes of camphor, have been also recommended.

LICHEN.

Syn.—*Papulæ; Papulæ siccæ; Scabies sicca; Gale seche; Scabies agria; Scabrities; Dartre furfuracée volante; Poussée.*

Lichen is the appellation given by Willan to an eruption of minute papulæ, sometimes red, but more generally differing a little from the natural colour of the skin, generally collected into clusters, and accompanied by much itching. Lichen in some cases exhibits an acute, but more commonly a chronic, character. All parts of the surface may be affected. Sometimes it is general, but more usually confined to one or several parts, the hands, forearms, neck, and the face being its most frequent seat. It appears in two very different forms; the *lichen simplex*, and the *lichen agrius.*

Lichen simplex is an eruption of small minute papulæ, rarely longer than a millet-seed, and clustered together. It is sometimes acute, but more frequently chronic; the papulæ are red, inflamed, and accompanied with heat and intense itching. Various terms have been given to the disease, according to some differences in its seat, aspect, and form. Thus, when parts covered with hairs are affected (*Lichen pilaris*), the papulæ appear seated at the roots of these appendices: this is a more than usually obstinate form of the disease. When it occurs on the legs of elderly and debilitated persons, it is often intermixed with petechiæ, and has a dusky red or livid colour (*Lichen lividus*). Sometimes the papulæ, instead of being irregularly scattered, appear collected into pretty regular and well formed groups with defined margins (*Lichen circumscriptus*). These patches extend by the development of fresh papulæ around their edges, whilst the centres heal up with slight furfuraceous desquamation. The patches are rarely distinct, and often coalesce by the increase of their circumferences.

In some cases, we have seen the papulæ of lichen composing a kind of lengthened band, extending from the anterior part of the chest to the inner surface of the arm, twisting on itself until it reached the point of the little finger (*Lichen gyratus* of Biett).

Two far more important varieties are the *lichen urticatus* and the *lichen strophulus*. In the *lichen urticatus*, the papulæ, which are much larger than in the other forms, are elevated, inflamed, and confluent like the stings of nettles. Their evolution is sudden, and attended with smarting and distressing itching. It is generally seated on the neck and face, but may extend over the trunk and extremities. It appears principally in spring, and during the heat of summer. Children, young persons, and females are more particularly liable to it. Sometimes slight febrile symptoms occur, and the eruption, which is very irregular and transient, often disappears spontaneously, but soon recurs; slight furfuraceous desquamation sometimes succeeds.

The *lichen strophulus* is a papular eruption very common in young children, and known under the name of *red gum*, *white gum*, and *tooth rash*. It very frequently occurs in infants at the breast: the papulæ are of different dimensions, red in one case and white in another, and very itchy. Lichen strophulus presents considerable diversity in its appearance, and those various forms are sometimes observed simultaneously on the same infant.

The papulæ are sometimes red, and are then frequently inflamed and prominent, scattered here and there, and intermixed with small erythematous patches (*strophulus intertinctus*, or *red gum*); in some cases they are smaller, but in more extensive crops, and appear in large irregular red patches (*strophulus confortus*, or *rank red gum*). A less common variety consists of smaller red patches of papulæ arising and desquamating successively on different parts of the body (*strophulus volaticus*).

The papulæ are sometimes white, consisting of minute, hard, whitish specks, a little elevated, sometimes though rarely surrounded by a slight redness (*strophulus albidus*); or they are much larger, of a smooth and shining surface, without surrounding inflammation, and in appearance of a lighter colour than the adjoining cuticle (*strophulus candidus*).

Lichen strophulus occurs in infants and young children when the constitution is accidentally disturbed by irritation, either in the alimentary canal, the gums, or other parts, and to the removal of which attention is to be particularly directed. The papular eruption is generally a mild disease, requiring only a few emollient tepid baths of milk and water, or decoction of bran.

Lichen agrius may appear spontaneously, or it may succeed to some of the slighter forms of lichen simplex. The papulæ appear on a red erythematous surface of various, though generally small extent; they are numerous, crowded together, and acuminated, and their evolution and progress are accompanied by burning itching, which scratching increases to a most insupportable degree. Towards the fourth or fifth day the inflammation increases: the tips of the papulæ become the seat of slight ulceration, and a sero-purulent fluid is discharged, which, concreting on the surface, forms small, yellowish, prominent, rough incrustations, which when detached are replaced by thin squamous scabs. The local inflammation gradually disappears in from twelve to fifteen days. In some cases, however, the discharge continues; other incrustations are formed and again replaced; and the disease may last in this form for weeks. Sometimes the lichen agrius puts on the chronic form; the fluid discharged becomes less and less abundant; the scaly scabs more dry, and are at last succeeded by a furfuraceous desquamation. This form, in which the skin sometimes becomes much thickened, may last for months.

Lichen agrius often appears on the face: it is rarely general. It occurs most frequently in spring and summer. The heat of the sun is often an occasional cause, and in tropical climates it is very commonly endemic: to this form a peculiar term has been given (*Lichen tropicus*). Errors in diet, late hours, grief, and other severe moral affections, frequently produce it; it not infrequently depends on gastric derangement: at other times, persons in perfect health are attacked with it from causes unknown.

Diagnosis. The diagnosis of lichen often requires great attention, and presents some difficulties. The elementary papular form of the disease must always be brought to mind. Lichen simplex has been sometimes mistaken for eczema,

scabies, and prurigo. The transparent vesicles of eczema sufficiently distinguish it. The itch, besides being vesicular, appears on the inside of the limbs, the palmar aspect of the wrists, and between the fingers; whilst the papulæ of lichen occur on the back of the hands, and outer surface of the limbs. It is sufficient to know that lichen circumscriptus has been mistaken for herpes circinnatus, to avoid the blunder. The papulæ of prurigo are larger and flatter than those of lichen; and their summits which are almost always torn by scratching, are covered with a small, dark brown scab of concreted blood: besides, the itching of prurigo is much sharper and more pungent than that of lichen. The large papulæ of lichen urticatus may sometimes be mistaken for erythema papulatum, or for lichen syphiliticus. The patches of erythema are larger, of a less bright red, and less prominent; the itching is much less severe, and the eruption does not, like lichen urticatus, disappear suddenly, and recur shortly after. The syphilitic papular eruptions are of an indolent nature, are never inflamed, and are free from pruritus. Their copper colour is, besides, a most characteristic distinction. The confluent and ulcerated papulæ of lichen agrius, in which there is exudation and subsequent incrustations, may require some investigation, to prevent it being confounded with eczema: in the former, the surface beneath the scabs is rough and granulated, not smooth and shining as in the eczema; besides, in searching carefully around the margins of the affected parts, some scattered remains of the elementary eruption in a nascent state are almost always to be found. The absence of pustules will always distinguish it from impetigo. It is much more difficult to distinguish chronic lichen agrius from chronic eczema; the pruritus, the thickening of the skin, and the occasional appearance of papulæ, are the only characters which denote the existence of lichen. In the squamous affections, the thick scaly cuticular incrustations can never be mistaken for lichen; and should any difficulty arise in distinguishing the disappearing patches of lepra, the concomitant symptoms will easily remove it. Lichen, it should be remembered, may be complicated with other eruptions, either vesicular or pustular, and therefore the presence here and there of a vesicle or a pustule must not be considered sufficient to form a diagnosis.

Treatment. Although lichen is often a mild disease, yet, in its chronic form, it frequently baffles for years every kind of treatment. Acute lichen simplex requires no other means of cure than a light antiphlogistic regimen and tepid baths, with a few alkaline baths towards the disappearance of the eruption, or when the itching is very troublesome. In chronic lichen the same means may be at first employed: tepid baths, rendered emollient with the decoction of bran; local emollient bathings; and afterwards the alkaline local baths (half an ounce or an ounce of sub-carbonate of potash to four or five pounds of water): sulphuro-alkaline baths will also prove useful. In some obstinate cases, frictions with an ointment containing calomel and camphor, or the proto-ioduret of mercury, may be applied to the diseased surface. In lichen agrius, more active means are required: in young robust subjects, venesection and sometimes repeated local bleedings by leeches around the seat of disease must be employed. Diluent drinks, emollient applications, tepid baths, severe dietetic regimen, and even fasting, are necessary; and, at a later period, the mineral acids, properly diluted, should be given in barley water, gentle aperients being at the same time administered. In this form, alkaline or sulphurous baths must be avoided at first, and only had recourse to when the inflammation is decreasing. In very obstinate cases the arsenical preparations have been found of great service; Pearson's solution appears to be the most appropriate.

PRURIGO.

Syn. — *Pruritus; Cresmos; Scabies papuliformis.*

Prurigo is characterised by distinct papulæ, larger than those of lichen, with scarcely any change of colour in the skin, which appear commonly on outward

surfaces and in the line of extension, and accompanied with sharp, burning, pungent itching of the most intolerable kind. Its progress is always chronic, lasting for months and even for years. Like all other papular eruptions, prurigo is not infectious.

It generally occurs about the shoulders, back, and neck, but sometimes the whole cutaneous surface, and even the face, is attacked. Sometimes, again, only small portions of the surface are affected. When it appears on the limbs and face, the disease is in general very severe. Dermatologists admit the three varieties of Willan, viz. the *prurigo mitis*, the *prurigo formicans*, and the *prurigo senilis.*

Prurigo mitis is the milder form: the papulæ are so small as scarcely to be perceived at first, and their appearance does not account for the intense degree of pruritus which attends them. They are generally intermixed with a number of small, thin, blackish scabs, formed by the concretion of the slight bloody exudation which oozes out when the tips of the papulæ are torn by the nails of the patient. This itching is much aggravated by stimuli and the heat of the bed.

Prurigo formicans. In this form the papulæ are often larger and more prominent; and the itching, which is more intolerable, has been compared to the sensation that might be produced by myriads of ants creeping over and gnawing the skin (*Prurigo formicans*), or to that of hot needles piercing it. The papulæ are distinct and isolated, and, when not torn by the nails, of the same colour as the skin. Heat, the warmth of the bed, and the use of stimulants, aggravate the pruritus to a most distressing degree, and scratching often produces not only redness but large wheals. These forms of prurigo sometimes disappear in a few weeks, with slight desquamation, but may be protracted, by successive eruptions, for months or years.

Prurigo senilis. In the aged, and in children of weakly constitution, prurigo is always a most obstinate disease, baffling all attempts to cure it. It may last with all its distressing symptoms for years, and even indefinitely. The papulæ become more general, harder, larger, and more prominent. Sometimes the skin thickens in several points, and there the papulæ become confluent. Vesicular or pustular eruptions (often ecthyma) sometimes complicate the disease, attended with fever, agitation, and general lassitude. Exacerbations of the disease are frequent, and most distressing. The general health suffers, the extremities become swelled and œdematous, and sometimes, when measures of cleanliness are neglected, pediculi are seen swarming in vast numbers on the surface of the skin. This latter form has been termed *prurigo pedicularis*; and the facility with which these insects are reproduced and multiply, is sometimes a matter of astonishment.

Several local varieties of prurigo are generally admitted, although papulæ are not always to be discovered on the parts. These are the *prurigo podicis* and the *prurigo genitalium.*

The *prurigo podicis* attacks more particularly persons of sedentary habits, and often accompanies piles or chronic inflammation of the rectum. The itching around the anus and the cleft between the buttocks, and sometimes extending to the scrotum, is most severe, and increases towards evening. This variety is always of long continuance, and most intractable.

The *prurigo genitalium* affects the scrotum in males, and the pudendum in females (*P. scroti*, *P. pudendi*). The first is a very distressing complaint, and the skin often becomes thick and scaly. The disease is still more intolerable in the female, in whom it is apt to spread from the labia to the mucous membranes of the vagina, the irritation and inflammation of which is frequently the cause of nymphomania.

Diagnosis. Prurigo is distinguished from lichen by the papulæ being larger, the itching of a more burning and pungent character, and by the thin black scales already mentioned. The itch is the disease with which it is likely to be most confounded; but the prurigo is commonly seen on the back, shoulders, and external surface of the limbs. Scabies is a vesicular disease, so that by slight attention they may be easily distinguished.

Treatment. If the skin be irritable and tender, tepid baths mixed with the decoction of bran, an antiphlogistic regimen, and avoiding all stimulating applications, are necessary. But other means, such as alkaline drinks, and weak alkaline baths, must also be employed: sometimes the mineral acids are beneficial. In weakly constitutions the regimen should be strengthening. Ointments with a small quantity of opium and the cyanuret of potassium sometimes greatly relieve the violent pruritus. When the disease is very obstinate, sulphurous water baths and the sulphur fume bath should be tried. In prurigo pedicularis, cinnabar fumes destroy the pediculi in a very short period. In the prurigo podicis and genitalium, local bleeding with leeches, cold emollient and narcotic washes, and afterwards the alkaline and sulphurous water baths, are the most useful remedies.

PSORIASIS.

Syn. — *Scabies sicca; Scabies farina; Serpedo serpigo; Psora leprosa; Dartre écailleuse; Dartre squammeuse lichenoide; Dartre squammeuse sèche; Dartre furfuracée; Dry Scall; Scaly Tetter; Scaly Leprosy.*

Psoriasis is a chronic inflammation of the skin, characterised by slightly raised red patches of various extent and form, and generally covered with whitish, lamellated, dry scales of different thickness. The characters which distinguish lepra vulgaris from psoriasis consist chiefly in the form or shape of the patches. We concur in opinion, therefore, with those writers who consider them as modifications of one and the same affection.

Psoriasis occurs under various forms, which have received appropriate denominations. In one case, the scaly patches are distinct, small, and scattered (*psoriasis guttata*); in another, they put on a very peculiar circular form (*psoriasis circinnata, lepra vulgaris*); in a third, they are larger, and cover large continuous surfaces (*psoriasis diffusa*); in a fourth, they appear twisted or in lines (*psoriasis gyrata*); in a fifth, the broad patches remain for many years, and the skin is deeply affected (*psoriasis inveterata*). Other denominations, such as those of *ophthalmica, labialis, preputialis, scrotalis, palmaria, dorsalis,* and *unguium*, indicate the various parts on which psoriasis is sometimes particularly fixed. We do not consider psoriasis to be contagious, although some authors maintain this opinion.

Psoriasis guttata is a mild form of this disease, and appears in small, red, distinct patches, with an irregular circumference seldom exceeding two or three lines in diameter, raised in the centre, and covered with thin white scales. This form is to be met with on almost every part of the body, including even the face, where they exhibit only a redness and roughness, without scales. It occurs with various degrees of severity, being confined, in some cases, to a few spots upon the back of the trunk, and external aspects of the limbs; in others, extending over almost the whole surface of the body, which is either covered at once by a general eruption, or successively by partial crops. Sometimes there is slight fever when the eruption is general. At first, small, red, distinct spots appear, and very shortly after, a small white scale is to be perceived in the centre. These little raised spots gradually, but unequally, enlarge, and small scales form on their surface, which is raised in the centre. Their appearance is that of large drops of fluid irregularly scattered over the surface on which they are seen. They are attended with but slight itching, and the scales when scratched off are quickly renewed. The patches disappear from the centre to the circumference. Psoriasis guttata sometimes coexists with one of the other forms.

Psoriasis circinnata (syn. *Lepra; Lepra vulgaris,* Willan; *Dartre furfuracée arrondie*) occurs in the form of distinct circular scaly patches, with raised circumference and depressed centre, sometimes intermixing so as to form a continuous scaly surface. All parts of the skin may be affected; but it is more

frequently seen on the limbs and near the articulations, especially the knees and elbows. It first appears in the shape of large, red, elevated, smooth, distinct papulæ, on each of which a small, thin, white scale soon forms, which is shortly after replaced by another. These small patches spread, but retain the circular form; the scales become thicker, especially at the borders, which appear elevated. As the patches spread, the centre becomes free, and generally remains so, except in some rare cases in which the scales accumulate over the surface and form thick prominent crusts. When the patches have attained the size of a shilling, or that of a dollar, they generally cease to increase in circumference; they sometimes, however, continue to spread till they attain a diameter of several inches, or more. When the patches are very large, their circular elevated borders are covered with thick, adherent, white scales, whilst the centre appears depressed and healthy. The patches, however, are not always distinct and separated by intervening surfaces of healthy skin, the small patches sometimes coalescing, and forming a continuous surface. This disposition is very commonly, and almost generally seen around the knees and elbows.

Whilst each separate patch thus increases in size, the eruption spreads progressively on the abdomen, shoulders, back, chest, and sometimes on the scalp and forehead, seldom on the face and hands. The scales which fall off are generally soon renewed: the subjacent surface is slightly inflamed,—smooth when the eruption is recent, rough and chapped when of long duration. In some cases the scales are not regenerated, so that the annular patches are of an enormous size, perhaps several inches in diameter, the rings being only red and elevated, and entirely free from scales; whilst other patches on the same individual present the common appearance of the disease.

The progress of annular psoriasis is always slow, often remaining for years, disappearing sometimes spontaneously, and again returning. When it disappears, the rings break, the elevations sink as they grow paler, and the patch gradually fades away.

The *psoriasis diffusa* occurs in the form of numerous red, papular-looking, flat, angular spots, commonly evolved so close to each other, that they speedily unite and form continuous surfaces, sometimes of great extent, and covered with thick, whitish, scaly incrustations, which are more or less adherent. This form is principally met with on the limbs, and it covers the whole anterior surface of the leg from the instep to the knee, or the whole extent of the posterior surface of the forearm: the elbows and knees are seldom free, and on these parts it disappears very slowly. Psoriasis diffusa appears sometimes simultaneously on many parts of the skin; we have seen it, on the same person, covering the greater part of the back, abdomen, and both arms, spreading down to the hands, the fingers being encased as with a glove. Beneath these scales the surfaces are very red, exceedingly tender and irritable, accompanied with a sensation of burning, and severe itching: the scales are not always thick and abundant. In many cases psoriasis consists of larger patches, irregularly circumscribed, exhibiting a rough, red, chapped surface, interspersed with very slight scaliness. Slight constitutional symptoms sometimes accompany the eruption. The local irritation is often considerable, with painful fissures and chaps, which greatly annoy the patient. This variety usually attacks adults, but it occasionally occurs in a severe degree in infants from two months to two years of age (*Psoriasis infantilis*, Willan), and its progress in these cases is sometimes remarkably rapid. The psoriasis diffusa is always a severe and intractable disease, lasting sometimes for several months or years. When it disappears, the elbows, backs of the forearms, and the shins, often show patches of the eruption when it has yielded elsewhere.

Psoriasis inveterata is the same affection, but of longer duration; it is principally met with among aged subjects, and in broken-down constitutions. The parts of the skin which are the seat of the disease are hypertrophied, thick, hard, and unyielding; its surface appears red, chapped, rough, and uneven. The scales are no longer thick and of large size, but a sort of furfuraceous desqua-

mation supervenes, which fills up the furrows and is readily detached. Sometimes, indeed, in these latter cases, no scales are found, the affected surface being red, uneven, and furrowed in every direction. When these patches surround the joints, they are intersected with deep, bleeding, and always very painful fissures. The inveterate psoriasis is most frequently seen on the limbs, extending even to the matrices of the nails, which become misshapen, rough, and ragged, split into pieces, and are replaced by others more like friable scales than nails. The *psoriasis gyrata* is a very rare variety of the disease, the patches of which are in stripes of a tortuous or serpentine form, resembling worms or leeches, or sometimes bending into rings. Its rare occurrence might render its existence doubtful, but M. Biett has met with it, though very seldom. The annular psoriasis (lepra), or syphilitic eruptions, have often been mistaken for it. The more local varieties present several peculiarities worthy of attention. *Psoriasis ophthalmica* appears sometimes alone, especially in childhood, and consists in small squamous patches, seated about the angles of the eyes, and on the eyelids, which are tense, dry, painful, itchy, and impeded in their motions. The inflammation sometimes extends to the conjunctiva, when the disease is very obstinate.

The *Psoriasis labialis* often occurs alone, or accompanies psoriasis of the scrotum, affecting the prolabium, especially of the under lip, the tender cuticle of which becomes thickened, cracks, and exfoliates sometimes for a long time. It forms, in some cases, a circle completely surrounding the mouth, and on which many perpendicular lines are seen going from the circumference to the border of the lip.

Psoriasis preputialis and *P. scrotalis* often exist together; it is very obstinate, as well as that of the pudendum in females. The skin is dry, thick, rough, and chapped, and the pain and burning pruritus are very distressing. The penis itself is sometimes surrounded with a scaly covering.

Psoriasis palmaria, vulgarly called the grocer's and the baker's itch, generally appears on the hands, rarely on the soles of the feet. It begins by a red, raised, hard spot, attended with heat and pain, succeeded by a white dry scale, which on falling off is replaced: the circumference of the patch increases, until the whole hand is affected, whilst the centre heals, but still exhibits a livid colour. Frequently the palmar aspect of the fingers, even to their points, are implicated; the affected parts become hard, stiff, and dry; the hand remains in a state of semi-flexion, and cannot be opened without great pain. The skin becomes thickened, and the lines naturally observed on the palm are changed into fissures, which bleed when the hand is opened. In females, this variety is sometimes complicated with psoriasis of the pudendum. Psoriasis palmaria is frequently met with in grocers, bakers, dyers, washerwomen, smiths, and other workmen, in whom the cure is very difficult from their returning too soon to their occupation.

The *psoriasis dorsalis* often affects the same class of persons, but it is occasionally met with in individuals of the better ranks, and who are therefore exempt from its usual exciting causes: motion of every kind produces deep and painful chaps around the joints.

The *psoriasis unguium* is a variety to which M. Biett has directed attention: it appears in conjunction with other forms, especially with the psoriasis guttata. The disease affects the matrice of the nails, the secretion of which becomes altered, and the nails misshaped, rough, thick, and scaly. The same appearance may be produced when seated on the fingers.

The *causes* of psoriasis in its various forms are often very obscure. None are contagious, though it appears to be sometimes hereditary. Both sexes are liable to it, and adults more frequently than young persons. It occurs in all seasons, but more particularly in the spring and in the autumn. Individuals, in other respects apparently in perfect health, frequently suffer from its attacks. It has been known to follow the abuse of spiced food and of spirituous liquors, the use of sea fish, exposure to cold and damps, and to have been evidently produced by certain violent moral affections.

Diagnosis. The different forms of psoriasis are generally easily distinguished. A mistake, however, in these cases is but of slight importance, the principal aim being to recognise the squamous nature of the disease. We refer to the peculiar appearance of each form, in order to distinguish them. The porrigo scutulata may be sometimes mistaken for annular psoriasis, or lepra of the scalp, in its declining stage. But the latter disease is generally met with on other parts of the skin: besides, in porrigo, the hair is destroyed, and the circle is evidently on the decrease when neither pustules or scabs are to be perceived. Psoriasis, in all its varieties, may be very readily distinguished from scaly syphilitic eruptions, which are known by their dusky copper colour, by the thinness and smallness of the scales, and, when of an annular form, by the rings being composed of small, distinct, smooth, shining, tubercular elevations, generally without scales, or with small, thin, hard ones. In chronic eczema, the scales are much more yellow, and the surface beneath more humid, than in psoriasis, and almost always some elementary vesicles are to be seen around the diseased parts. The round, distinct patches of lichen circumscriptus may sometimes be considered as patches of psoriasis; but, with a little care and attention, the papulæ of the first are always to be detected. Biett differs from Willan with regard to the conversion of lichen into psoriasis diffusa. Biett admits that scales may cover the lichenoid surfaces; but he remarks, that with care the papulæ are always to be distinguished. It should be remembered, that psoriasis may coexist with porrigo favosa or other eruptions.

Treatment. Without being a dangerous disease, psoriasis in all its forms is very obstinate, the P. guttata being the most yielding. With regard to the treatment, the observation so often made by M. Biett, in his clinical lectures, is always to be kept in mind, viz., that it is almost impossible to judge *à priori* what remedies will be the most advantageous; and that, often, the various therapeutical means we possess must be tried in succession before the right one is discovered.

The state of the general health and constitution is first to be attended to. If the progress of the disease be rapid, the subject young and strong, the skin very red, and the pulse full, venesection, tepid and emollient baths and washes, mild diluents, rest, and a strict regimen, must be prescribed. In weakly, worn-out constitutions, and elderly persons, and when no marked signs of inflammation accompany the eruption, gentle tonics, light nourishing food, and good air, should be resorted to, with the view of improving the general health before a more active treatment is brought to bear on the disease.

These precautions being taken, the means we should employ may be divided into external and internal. Some practitioners recommend the first alone; but on this point we agree with MM. Biett and Cazenauve, who, admitting the utility of external applications, consider them as auxiliaries only, and of signal service after a course of internal treatment. The more active external methods of cure cannot well be employed with safety, when the psoriasis covers a large portion of the skin. Ointments and liniments, containing the ioduret of sulphur, the nitrate of mercury, or the white precipitate in graduated doses, are to be relied on chiefly. Tar ointment or the kreosote ointment have produced good effects. The patches also may be touched with a liniment consisting of olive oil and rose water, of each one ounce, and of the liquor potass half an ounce; when they are small, as in P. guttata, they may sometimes be advantageously treated by touching the spots with the strong acetic acid, or aromatic vinegar, or the mineral acids more or less diluted. Other external remedies of great efficacy as auxiliaries, are baths of different descriptions, and principally the vapour baths and vapour douche, with or without sulphurous waters, and the sulphur fume bath.

All these local irritating applications must be carefully avoided in the early and more inflammatory stage of psoriasis, at which period, emollients, such as the decoction of bran, tepid milk, &c. give relief. The local remedies are to

be reserved for the later stages, and even then, only a few patches must be anointed at a time, and when the desired effect is obtained, other patches may be treated in the same way.

Among the internal remedies which have sometimes proved of service, we may mention the decoctions of dulcamara, much extolled by Crichton in the treatment of lepra, of mezereon, and ormis pyramidalis bark, the watery extracts of white hellebore, of the rhus radicans, the rhus toxicodendrum, &c.: their virtues, however, are very doubtful. In many experiments made by M. Biett, sulphur has sometimes appeared to be a useful auxiliary. Antimony, and especially the sulphuret, has always been unsuccessful. Mercury in the metallic state, and in the form of the deuto-chloruret, has not been more successful. Calomel alone has often succeeded, but it appeared to act as a purgative. Pitch or tar has generally failed.

The result of M. Biett's experiments tends to prove that the most successful internal treatment is the exhibition of purgatives, tincture of cantharides, and the different forms of arsenic. It would be very difficult to say in which case the one or the other is to be preferred; purgatives often answering when the tincture of cantharides has failed, and *vice versâ.* The following rules, however, may be followed.

Purgatives are generally of service when psoriasis in its various forms is recent, and of small extent; they answer very well in children. Calomel has been given in doses of four grains every morning fasting, or mixed with equal parts of jalap. Sometimes half an ounce of sulphate of magnesia or of soda in a quart of some bitter infusion, and continued for some time daily, produces a good effect. In some cases more active cathartics, such for example as aloes, gamboge, colocynth, or scammony, have succeeded. The choice is difficult, but, generally speaking, calomel in the doses stated, continued daily for two months or more, is admitted to have had the most success. Should salivation come on, it must be suspended for a time. It should always be remembered that whatever purgative be chosen, its action must be gentle and slow: the doses must therefore be small, and their exhibition now and then intermitted for a few days.

The tincture of cantharides seems more useful when the squamous disease reappears without evident cause; when it occurs among subjects of soft or flabby constitution; when the psoriasis is very extensive; and when a course of purgatives have been resorted to without advantage. The dietetic regimen must be severe, and the tincture prescribed in doses of three to five drops in water every morning. The effects of the medicine must be sedulously watched and, if no untoward symptoms appear, the dose may be increased about five drops every sixth or eighth day. The moment sickness, or heat of stomach, scalding in the urethra, or pain in the bladder, or diarrhœa, are complained of (which, however, rarely occur), the dose of the medicine must either be greatly diminished, or its use suspended entirely. Exhibited thus with this caution, we have often seen the dose gradually increased to twenty-five and thirty drops without the slightest inconvenience. In females especially, a cure is often effected in forty-five or fifty days; and we have seen a case of psoriasis orbicularis (lepra), of eighteen years' standing, disappear in M. Biett's hands after one month's exhibition of this remedy.

Arsenical preparations are of inestimable value in the more inveterate cases of the disease, which have existed for years, and when all the other medicines mentioned have been unsuccessfully employed. Indeed the chance of their good effects appears almost certain in the latter case. The proper precautions to be observed in administering this potent remedy must never be omitted, and with these, its exhibition is no more dangerous than that of many other medicines daily prescribed. The arseniate of soda, or Pearson's solution, is the mildest form in which arsenic can be given; but the action of Fowler's solution is more active. The one occasionally succeeds when the other has failed. Pearson's solution is to be prescribed in doses of a scruple to half a drachm or a drachm;

and Fowler's solution in the dose of three, four, or five drops, once or twice a day, in barley water, and gradually increased till from twelve to fifteen drops are taken daily. The Asiatic pill (R. Arsenici Protoxidi gr. j; Pip. Nig. gr. xij; Pulv. Acac. gr. ij; Aq. Distill. q. s.; divide in pil. xij vel xvj æquales) sometimes succeeds when the other forms of arsenic have failed in psoriasis inveterata; and, in the same obstinate disease, M. Biett has lately obtained successful results with the arseniate of ammoniac administered in the same doses as Pearson's solution.

Whatever method may have been employed, there almost always remains a few obstinate patches around some of the articulations. The ointment of proto-ioduret, or the proto-nitrate of mercury, has a very good effect, and should be applied morning and evening. The application of blisters to the diseased parts in very obstinate cases must be often renewed to be successful: eight or ten applications are sometimes necessary to remove a single patch.

The varieties, independently of the general treatment, which consists principally in the administration of purgatives, often require other measures. A few leeches behind each ear are useful in the onset of psoriasis ophthalmica. In the psoriasis of the lips, a mixture of calomel and axungia is very beneficial. The same ointment is of great use, combined with emollient lotions, in the psoriasis preputialis. In obstinate psoriasis of the scrotum, sulphurous or cinnabar fumes are employed with much advantage. Lastly, in the psoriasis palmaria, after softening the diseased surface with emollient lotions, such as a decoction of bran, stimulant ointments may be had recourse to, such as the ioduret of mercury or of sulphur, or the pitch or kreosote ointment. In these local varieties the vapour douche will be found a powerful auxiliary, but the sulphur fume bath is more useful in the psoriasis scrotalis.

Besides these means, the restricted regimen must be strictly enforced, the use of spirits strictly forbidden, and the causes of the disease, if possible, avoided. It unfortunately too often happens, that having effected a cure of psoriasis in its worst form, after several months' treatment, the disease returns from the intemperance of the patient.

PITYRIASIS.

Syn. — *Dartre furfuracèe volante; Porrigo Chloasma; Psoriasis; Lichen; Dandriff.*

The Pityriasis (πίτυρον, meal) is a slight, superficial, chronic inflammation of the skin, characterised by a copious, furfuraceous, cuticular desquamation, which is continually renewed. Its most frequent seats are the scalp and the parts covered with hair, and it is generally attended with some change in the colour of the diseased integuments. On these grounds are founded the division of pityriasis in four species: *pityriasis capitis; pityriasis rubra; pityriasis versicolor;* and *pityriasis nigra.*

The *pityriasis capitis* is often met with in childhood, and also in adults, and sometimes in elderly persons. Its appearance is known by slight itching, and the copious furfuraceous exfoliation which follows scratching. Sometimes, beneath these abundant small minute scales, slight superficial spots may be perceived at the onset. The cause is not easily ascertained: on the beard it is sometimes evidently excited and kept up by the irritation of the razor; and on the head too much combing with a fine tooth-comb appears in some cases an exciting cause. Its development is often accompanied with an inactive state of the secreting bulbs of the hair.

The *pityriasis rubra* appears in small, light, red spots, of the size of a split pea, which gradually extend, coalesce, and form large continuous surfaces, covered with mealy or scurfy desquamation, under which the cuticle appears red. The desquamation increases, and a troublesome itching with a feeling of stiffness is complained of. The surface is generally rough to the touch,

although in some cases it is smooth, which depends on a sort of oily secretion which exudes. The action of heat, the rays of the sun, and especially acute moral affections, often appear to be occasional causes. When the redness and scales disappear, the patches are left of a yellowish or sallow hue.

The *pityriasis versicolor* is remarkable for the variegated discoloration of the cuticle. It appears mostly on the breast and epigastrium and other covered parts, sometimes on the arms and shoulders, in brown patches of various shades, interspersed with portions of the natural hue. The whole back and abdomen, and even the face, have been seen affected simultaneously. A continual mealy and scaly desquamation covers these patches, which distinguishes the disease from ephelis. Slight itching accompanies the eruption. The abuse of spirituous liquors, overheating the body, eating fruit, mushrooms, &c. are probable causes.

The *pityriasis nigra* has been frequently observed in the acrodynia, which raged epidemically in Paris in 1828 and 1829. In this variety, the furfuraceous desquamation takes place on a darkened or even deep black surface. It occurred in two forms: in the one the epidermis was dark-coloured, covering a reddened surface; in the other the cuticle was transparent, and the subjacent cutis was the seat of the black coloration.

Diagnosis. The small size and great abundance of the scales in pityriasis, and the absence of any elevation, distinguish it at once from the various forms of psoriasis. The absence of vesicles, papulæ, and pustules, prevents it from being mistaken for such cutaneous diseases as are accompanied in their decline by furfuraceous desquamation. The absence of the mealy exfoliation in ephilis, lentigo, and the rest of the maculæ, sufficiently distinguish them from the variegated pityriasis.

Treatment. The pityriasis capitis in children requires only cleanliness, and avoiding combing too hard; a soft brush may be used. When in a more severe degree or of greater extent, laxative drinks, the sulphate of soda or subcarbonate of potash in doses of one or two drachms dissolved in a quart of water, alkaline lotions applied to the parts, alkaline baths and vapour douche, are to be employed. If very extensive, the vapour bath is beneficial. The pityriasis rubra requires, at the onset, antiphlogistic measures. Venesection may even be necessary in adults, with tepid, and at a later period, the alkaline baths. Should it still continue obstinate, the sulphurous water bath as well as the vapour bath must be had recourse to. Sulphurous water baths and lotions are the best means in pityriasis versicolor; and the vapour bath or douche in pityriasis nigra.

ICHTHYOSIS.

The Ichthyosis, or *fish-skin disease*, is characterised by a thickened, hard, rough, scaly texture of the cuticle, which is of a dirty grey or green colour, split into square and angular compartments of different sizes, resting upon a surface that is never inflamed, and from which it does not exfoliate as in psoriasis. The thickness of the diseased cuticle is sometimes greatly increased, but there is never any heat, pain, or pruritus. It is often hereditary.

The alteration of the cuticle in ichthyosis occurs in every degree of intensity: occasionally it is very slight, the surface exhibiting a rough, dry, dirty, and somewhat thickened appearance only; in more severe instances, the thickness, hardness, and roughness become much greater, and the colour is black or nearly so. The roughness, which gives to the finger passed over it the sensation of the surface of a file or the roughest shagreen, is occasioned by innumerable rugged lines and points into which the cuticle is divided. The hardened pieces of cuticle may generally be detached without pain, and without leaving any redness behind. The skin is sometimes cleaned by vapour or sulphurous water baths; and the cutis appears extremely dry, rather thickened, its furrows being more distinct. When general, there are some parts, such as the eyelids and face, the axillæ, groins, and prepuce, the palms of the hands

and the soles of the feet, which are rarely affected, even when every other part of the body is incased as it were in a rugged shell. The knees, fronts, and outer surface of the legs and thighs, the elbows and outer and posterior aspect of the fore-arms and arms, are the common seats of the affection : whether it is partial or general, these situations are more thickly beset than any other. Its other more common situations are the front of the neck, the breast, and the upper and posterior part of the trunk. Ichthyosis is sometimes confined to parts of small extent ; and although the face is seldom affected, Bateman mentions a case in which it was the exclusive seat of the disorder, a large patch covering each cheek and communicating across the nose. The mammæ in females have been seen incased in the rugged cuticle of ichthyosis. Where the integuments are covered, as sometimes occurs, with excrescences of a horny nature, the disease has been termed, by Willan and Bateman, ichthyosis *cornea*. The health is generally not in the least disturbed.

Diagnosis. No doubt can arise concerning the nature of the disease when it is general, and but slight attention is necessary to distinguish the partial ichthyosis from the desquamation which succeeds to various chronic affections of the skin.

Treatment. This disease, when general, is very little under the control of medicine : frequent bathing and proper cleanliness are the best measures. In partial cases, emollient bathing, and afterwards stimulant frictions or vapour douches, are sometimes of service. We have seen a case of partial ichthyosis, under M. Biett, disappear by the frequent application of blisters to the part. Pitch pills may be given, although this remedy has not proved very successful. It should be taken in considerable quantity, if it is intended that it should have a fair trial.

LEPRA TUBERCULOSA.

Syn. — *The Tsarath of Moses; Lepra Hebræorum; Lepra Ægyptiaca; Elephantiasis Græcorum; Leontiasis; Satyriasis; Lepra leontina; Lepra; Leuce; Baras; Vitiligo; Lepre tuberculeuse; Ladrierie; Mal rouge de Cayenne; Aussatz.*

Lepra Tuberculosa*, or Greek Elephantiasis, is characterised by the eruption of fawn-coloured or yellowish brown tubercles, various in size, irregular in shape, somewhat shining, and soft and smooth to the touch. These tubercles are preceded by erythematous patches, in which the sensibility of the skin is diminished: slightly elevated at their onset, they become afterwards more projecting; whilst the sensibility of the parts is usually quite lost, although they are sometimes painful when touched. They more frequently occur upon the face, the nose, the ears, the lips, &c.; and being accompanied with a thickened and rugous state of the skin, they cause a most hideous distortion of the features, and frightful deformity.

The evolution of the leprous tubercles is usually preceded by that of slight erythematous patches of a tawny red hue in whites, and blacker than the surrounding integuments in negroes. These patches are worthy of attention, since they announce the dreadful disease which is about to appear. When they are of some duration, the skin in these points already begins to lose its sensibility. Sooner or later, in some cases quickly, in others very slowly, small, soft, livid red tumours appear, varying in size from that of a pea to that of a walnut, or even larger. When these tubercles come out, the erythematous patches, on which the sensibility of the integument had become lessened, sometimes become painful; so much so, that we have heard patients declare that the pain produced by the handling of the small tumours at this period was similar

* The term of Lepra tuberculosa appears to us to be more appropriate for general use than that of Greek Elephantiasis, by which this disease is usually designated ; conveying a more distinct and accurate idea of the disorder, so widely different from the Arabian Elephantiasis, or Barbadoes leg, in which the lower extremities, swelling to a monstrous size, have been justly compared to the legs of the elephant.

to that felt when the cubital nerve receives a blow at the elbow. When they appear on the face, they are generally accompanied by a puffy swelling of the surrounding parts.

Sometimes, only small surfaces are attacked; we have seen the nose and ears alone affected, and much swollen and enlarged. When the disease occurs on the lower extremities only, it is found on the inferior part of the thigh and around the ankles.

After remaining stationary a longer or shorter time, the disorder increases: instead of a few tubercles to be met with here and there, the whole face is covered with large dusky red lumps separated by deep furrows; the features are horribly distorted; the alæ of the nose are thickened and swollen, the nostrils dilated, the eyebrows tuberculated and overhanging, the lips enormously thickened; the skin of the forehead and cheeks is thick, uneven, and tumid, the chin much increased in size, and the whole of the affected surfaces appear as if smeared with oil, and of a dusky livid red; the external ears, especially the lobes, are much enlarged and thickened, and beset with tubercles; the eyebrows and eyelashes and beard fall off; the sense of smell becomes impaired, or totally lost; that of touch is often strangely affected; the voice grows husky, and is frequently quite lost; the eyesight is greatly weakened; the unfortunate patient is dejected, and the muscular powers depressed in a singular manner. With regard to the *libido inexplicabilis* so much spoken of, our observations do not coincide with those of Dr. Adams, who mentions actual wasting of the generative organs. In the cases which have come under our notice, we have witnessed quite the reverse, and yet several were young men in whom the disease was not too far advanced. The disease pursues a similar course on the other parts, which are swollen, thickened, and enlarged, whilst the sensibility is lost. The tubercles severally run their course independently of each other.

At a still later period the symptoms are even more dreadful: the tubercles become the seat of ulceration, and sores of an unhealthy character succeed, and discharge an ichorous fluid, which, on concreting, form dark adherent scabs of various extent and thickness. These incrustations are sometimes followed by cicatrices, but this is unfortunately a rare occurrence. On the extremities the thick and tuberculated skin becomes divided by fissures, and ulcerates, or is corroded under the dry scabs, so that the fingers and toes mortify, and separate joint after joint, the miserable patient surviving these horrid mutilations. Those individuals whom we have seen perish from this disease were carried off by enteritis: large ulcerations were found in the ilium, cæcum, and colon, excepting in one case in which death was caused by tubercular phthisis.

Lepra tuberculosa is not contagious, but it appears to be hereditary, though not necessarily so. M. Biett lately attended a lady from the West Indies affected with tuberculous leprosy in a very severe degree, who had been delivered of several children since the disease first appeared. These children, who are now of a certain age, enjoy excellent health, and do not show the least symptoms of Greek elephantiasis. This disease attacks both sexes equally, and appears at all periods of life, but less frequently in elderly persons. The cases seen in Europe generally come from the West Indies and other colonies. We have seen it in a young Portuguese, who, according to his statement, had never left Portugal before the appearance of the disease. In the colonies, damp dwellings, malaria, unwholesome food, especially pork, often appear exciting causes; to these may be added over-working, too free use of spirits, and especially depressing moral affections.

Diagnosis. In the commencement, the erythematous patches may be considered as symptoms of a disease far less fearful than the lepra tuberculosa, and often for a time mislead. The impaired or total loss of sensibility in these points of the integuments, their dusky red hue, soft feel, and the circumstance of the patient having previously inhabited a tropical climate, may assist the

diagnosis: the mistake would, however, be only that of not foreseeing the disease that is about to occur. At a more advanced stage, we conceive an error to be almost impossible, if we compare the symptoms of the occasional tubercle of lupus, of those connected with a syphilitic origin, of mollusca and frambœsia, with those of elephantiasis.

Treatment. This disease is seldom observed in its early stages, generally not before it has existed even for years. On its first appearance, the climate should be immediately changed, as at this period alone can any benefit be anticipated from curative measure.

The vapour douche, friction with volatile liniments, or, what is still more efficacious, the repeated application of blisters to the diseased surfaces, may be tried. When the disease is limited in extent, to the ears or face for example, the ointment of the hydriodate of potash (one scruple to an ounce of axunge) is often very beneficial, the vapour douche being frequently applied at the same time. When it is more extensive, and the tubercles have not ulcerated, warm water, alkaline, or sulphurous baths are to be employed; and, if the state of the bowels admit of them, arsenical preparations, or the tincture of cantharides, are to be administered with the precautions, stated in the treatment of psoriasis. In the advanced stages, M. Biett has employed the actual cautery with success. It should be kept in view, however, that, from the frequent complication of irritation or inflammation of the gastric mucous membrane with elephantiasis, it is impossible to exhibit remedies of an active or irritating character, more especially preparations of arsenic or cantharides. Under such circumstances, a soothing course of internal treatment, comprising measures calculated to allay the intestinal affection, is to be adopted, while we endeavour to ameliorate the condition of the skin by the external treatment already noticed.

LUPUS.

Syn.—*Herpes exedens; Lupus vorax; Herpes Æsthiomenes; Formica corrosiva; Dartre rougeante; Estiomene.*

Lupus is a disease of the skin most commonly seated on some part of the face, and characterised by a peculiar tendency to destroy not only the part on which it occurs, but also the adjoining tissues. It is not invariably a tubercular affection: a frequent variety of the disease does certainly commence in another form, but it is better to include it among the tuberculæ than to describe it separately. According to the various aspects it assumes on its commencement, lupus forms three very striking varieties: 1. That in which continuous surfaces are destroyed; 2. That which destroys in depth; 3. Lupus attended with hypertrophy or thickening of the diseased surfaces. This division, adopted by M. Biett, is most practical, and founded on long and careful investigation.

1. The first variety, or lupus which attacks continuous surfaces of various extent, appears in several forms. Thus, in some cases the superficial layers of the skin are alone destroyed: this form principally occurs upon the cheeks. There are neither tubercles nor incrustations. The skin of the parts affected acquires a marked reddish tint, and a slight epidermic exfoliation takes place on its surface, which is smooth, red, and shining. No pain is felt by the patient, but the part is tender when touched; the redness disappears upon the pressure of the finger; and after the disease has remained some time, the skin is evidently reduced in thickness. When the malady stops, the cuticular exfoliation ceases, and the redness declines, but the skin always remains thin and shining as if seared by a red-hot iron. In other cases, several small, soft, dusky red, distinct tubercles appear, and cover a surface of various extent. These may remain stationary for a time, perhaps a few weeks only; or they may be protracted for several months, and even years; when, suddenly, they become the seat of irritation, their number increases, the intervening space appears swelled and œdematous, the tubercles join by their bases, their sum-

mits ulcerate, and they form a continuous ulcerated surface of various extent and irregular form. Thus the whole cheek may be attacked by the disease, which slowly extends over the whole face, destroying the nose, and spreading to the front of the neck. This variety, the tendency of which is to destroy the surface of those parts on which it appears, occurs not only on the face but also in large continuous patches upon the chest, the anterior aspect of the thighs, and the extremities. The crusts are thick, blackish, and rough; and when cicatrices form, they are very thin, tender, and of a livid hue. Tubercles often reappear in the midst of the cicatrices, and ulceration again commences.

2. The lupus, in which parts are destroyed in depth, begins by the appearance of one or more small tubercles on the alæ, or tip of the nose: they are smooth, soft, and dusky-coloured. After remaining indolent for a variable length of time, they form deep ulcerations, which often gradually destroy the whole tegumentary and cartilaginous structures of the nose, the septum included; so that a large triangular opening, at length, leads directly from the face into the nasal fossæ. This variety often begins in the mucous membrane of the nose, and we have seen the cartilaginous septum destroyed before the nose had become ulcerated externally. Sometimes the destructive ulcer begins upon the skin, penetrates into the nasal fossæ, and returns by the roof of the mouth and gums, destroying more or less the parts it attacks.

3. The lupus with hypertrophy is almost always confined to the face, where it appears in the shape of soft, slightly prominent, and indolent tubercles, generally numerous, and developed simultaneously over a considerable extent of surface. Ulceration rarely takes place on their summit; but their base appears to enlarge, the skin and subjacent cellular substance swell slowly, and rise so as to fill up the spaces between the tubercles. Sometimes the whole face is thus enormously enlarged, giving the patient a most hideous appearance. This variety is attended with little, if any, ulceration.

These varieties often exist together. Large portions of the lips and of the eyelids are sometimes destroyed, and the conjunctiva becomes the seat of chronic inflammation, which, in some cases, brings on blindness.

The *causes* of lupus are unknown. Young persons of a scrofulous habit appear more subject to this frightful disease than others. It has, however, been seen to attack individuals apparently of the soundest constitution. It is not contagious.

Diagnosis. With moderate attention, lupus can scarcely be mistaken for any other disease. The indurations which follow acne have been preceded by the pustulur eruption. Lepra tuberculosa is known by the loss of sensibility, and the peculiar fawn-colour of the tubercles. Cancerous tumours are hard and painful; the tubercles of lupus soft and indolent. Syphilitic tubercles are hard and of a dark copper-red colour; besides, other symptoms of syphilis coexist. The thick incrustations of impetigo are yellow, rough, and not very adherent; those of lupus are of a dark-brown colour, thick, and very adherent.

Treatment. The only efficient remedy in lupus is the early destruction of the part on which the disease appears, by caustics. This must be done, not by the actual cautery, but by the application of arsenic or cinnabar. The chloride of zinc is also a very useful caustic. With regard to internal remedies, a course of chalybeates, tonics, or of the muriate of baryta or of lime, may be prescribed with great advantage.

FRAMBŒSIA.

Syn.—*Pian; Yaws; Micosis* (Alibert).

Frambœsia (Framboise, raspberry) is a disease indigenous in Africa, whence it has been conveyed to the West Indies and America: it is rarely, if ever, seen in Britain. It is characterised by the evolution of small, red, tuberculous tumours, generally distinct from each other at their summit, but connected by

their base, and very similar in their form, colour, and size to a raspberry or mulberry: they appear on surfaces of various extent, and occur on all parts of the surface of the skin, but more frequently on the scalp, the face, the axillæ, in the groins, around the anus, and on the organs of generation.

Person of all ages may be attacked, but it is more common in children and young people. It is contagious, and is propagated by the contagion of the matter discharged from the eruption. It is said to affect the same person only once during life. It sometimes appears spontaneously: filth, misery, and unwholesome food, and living in damp dwellings, are its more evident exciting causes. Negroes are more frequently attacked than whites.

The disease begins by solid elevations of a papular nature, and their eruption is sometimes accompanied by general symptoms. The affected surface is sometimes of limited extent; but in a case which came under our observation, it occupied the whole of the front and inferior district of the thigh, the size of the tubercle varying from that of a pea to that of a hazelnut: the vegetations appeared seated in the substance of the dermis, which was in a state of hypertrophy; and, instead of cuticle, they were covered with dry, adherent, thin scales. In warm climates, the tumours frequently ulcerate and discharge a fetid ichor, which sometimes forms thick crusts. One of the tuberculations generally acquires much larger dimensions than the others, and afterwards forms a foul and sloughy ulcer, which the negroes call the *mama pian* or *mama yaw*. The disease is usually of long duration, and leaves well-marked cicatrices, but is not attended by much pain.

According to Bateman, frambœsia is propagated solely by the application of the matter discharged from the eruption to wounded surfaces of persons who have not previously passed through the disease. It does not appear to be propagated by effluvia; and, like the febrile eruptions, affects the same individual only once during life. In Africa it is generally undergone during childhood.

Diagnosis. The only disease for which frambœsia may be mistaken is some form of syphilitic tuberculous eruption. These latter often return, their colour is peculiar and characteristic, and they never form fungoid tubercles united by their bases, covering surfaces of various extent.

Treatment. According to Dr. Winterbottom, the natives in Africa "never attempt to cure this disease until it has reached its height, when the fungi have acquired their full size and no more pustules appear." (*Account of the Nat. Africans of Sierra Leone.*) It would appear from the experience of those who have seen the disease in tropical climates, that no remedy yet discovered has any influence over its progress. All, therefore, that is necessary in the first stage is to enjoin a moderate cooling regimen. When the disease is on the decline, indicated by the eruptions beginning to dry and then ceasing to multiply and enlarge, the treatment should consist of a moderately nutritious diet, pure air, proper clothing, and the exhibition of sarsaparilla, bark, and the mineral acids in succession, with mild laxatives and alterative doses of mercurials according to circumstances. Dr. Bateman states, that the *mastu-yaw* sometimes remains large and troublesome after the rest of the eruption has altogether disappeared. It requires to be treated with gentle escharotics, and soon assumes a healing appearance under these applications. Stronger caustics are requisite for the cure of the *crab-yaw*, or tedious excrescences which occur on the soles of the feet. (*Cut. Dis.*, p. 315.) In the case we saw under the care of M. Biett, the actual cautery was employed with the greatest success. The different preparations of iodine and other stimulant applications appear to be indicated in this disease.

MOLLUSCUM.

Molluscum is characterised by the appearance of numerous tubercles, of slow growth and little sensibility, and of various sizes, from that of a vetch to that

of a pigeon's egg. These contain an atheromatous matter, and are of various forms, some being sessile, globular, or flattish, and some attached by a neck and pendulous. The growth of the tubercle is apparently unconnected with any constitutional disorder; they show no tendency to inflammation or ulceration, but continue through life, having apparently no natural termination. This short and trite description, taken from Bateman, perfectly delineates the disease, which is always seen in clusters or groups, although the small tumours are distinct. Bateman admits of two varieties, — the contagious and the non-contagious. The contagious is characterised by the occurrence of hard, and round, prominent tubercles, smooth, transparent, and pouring out, from an orifice on their summits when compressed, a little opaque or milky fluid. Bateman never met but with two cases of the contagious disease; the one on the face and neck of a young woman, who ascribed the origin of the disease to contact with the face of a child, whom she nursed, on which a large tubercle of the same sort existed: the second case occurred in an infant who had apparently received it from an older child, who was in the habit of nursing it. We have never observed it; and M. Biett, who has seen so much of diseases of the skin, has not met with it. Dr. Carswell saw in Edinburgh a third case similar in appearance to those of Bateman. Here, again, an infant at the breast, whose face was the seat of the affection, communicated it to his mother, whose breasts were the parts affected; and also to two other members of the family, in whom it appeared upon their hands. The child himself seemed to have contracted it from a brother, who caught it from a boy at school. The infant died.

Treatment. The non-contagious molluscum is very obstinate, the most stimulant applications proving inefficacious. In the other variety, Bateman appears to have seen the disease improve under the use of Fowler's solution.

CHELOIDEA.

Syn. — *Cancroide; Keloide.*

The terms of keloide and cancroide have been given by M. Alibert to a chronic, isolated, tubercular swelling of the skin, from a supposed analogy of form between a crab or a tortoise and this small flat induration. This disease, which is of rare occurrence, first appears in the shape of a slight indolent tubercle, soon forming a small flat tumour of an irregular oval, square, or angular form, of a more or less pale or deep red colour, with a slightly depressed centre, hard and unyielding to the touch, and covered with a thin, shining, wrinkled cuticle, which gives its surface the appearance of the cicatrice of a burn.

In most cases this small tumour appears single; but in others, two, three, or even eight, have been met with; and when several appear together, they are always separated from each other by intervals of healthy integument. In size it has been sometimes found to measure from an inch and a half to two inches in its largest diameter, whilst it sometimes does not exceed a few lines across, especially when there are several in number. These small flat tumours only rise a few lines above the level of the surface, and this elevation is generally much more striking on the circumference than in the centre. They evolve and increase without or with very little pain, and indeed sometimes remain indolent through life; but in other instances they occasion sharp shooting pains, which occur principally after meals, and on atmospheric changes.

The duration of these small tumours is various: they sometimes remain for years; in other cases they disappear slowly, and leave a slight cicatrix, although no ulceration had taken place. Ulceration very rarely, if ever, occurs, and that only in consequence of injudicious attempts to discuss the tumour. They are not at all dangerous.

The usual seat of the cheloidea is on the front of the chest, between the mammæ; they have been also seen upon the neck, the side of the thorax, and no

the arms. Both sexes are equally attacked, but the cause is very difficult to ascertain. In general, young persons, and those under the middle age, are only affected; it has never been observed in children. In one case a deep scratch in the front of the chest appeared to be the exciting cause.

Diagnosis. The cutaneous cancer is the disease for which these small tumours may be most easily mistaken; this is a small, prominent, round, livid-coloured tumour surrounded by dilated veins: at a later period the neighbouring lymphatic glands become enlarged, and ultimately ulceration of the tumour takes place. The tubercular tumour of the cheloidea is a flat, angular, or irregular long oval patch of swelled integument, the circumference being somewhat higher than the centre, and of a rosy red colour, differing but little from that of the surrounding parts: there is, moreover, no tendency to ulceration. The peculiar colour of syphilitic tubercles, and other symptoms of the disease, sufficiently distinguish them from the cheloidea.

Treatment. The sulphurous douche has been of much service in one case. Friction and applications which are too stimulating should be avoided. The application of a plaster containing the hydriodate of potash, or iodine, is preferable. Should the pain be acute, the iodine may be mixed with an opium plaster. Alkaline baths and gentle laxatives are useful as auxiliaries.

LENTIGO.

Syn.—*Freckle; Tâches de Rousseur; Ephelis lentiformis; Pannus lenticularis* (Alibert).

Lentigo, or Freckle, is the name given to the multifarious small, rounded, brownish yellow or fawn-coloured stains that appear upon the face, bosom, hands, neck, more especially in individuals of fair complexion and delicate skin. Sometimes these spots cover the whole surface of the body: they are generally most abundant in childhood and youth, and are much less seen in dark complexions, in manhood and old age. They are evidently induced by exposure to light and heat, although they do not seem to result from the direct action of the sun's rays. The parts upon which they appear never evince the slightest symptom of derangement. The best mode of preventing their appearing or increasing, which they generally do in spring, is to avoid carefully a too vivid glare of light, and to protect the skin by some slight covering. They require no treatment.

EPHELIS.

Syn.— *Liver Spots; Tâches hepatiques; Pannus hepaticus; Cloasma.*

Ephelis is characterised by one or several irregular-shaped broad patches of a light or dark yellowish brown, occurring most frequently on the front of the neck, chest, abdomen, groins, and inner part of the thighs, generally accompanied with itching, and sometimes with slight desquamation of cuticle.

The patches of ephelis generally appear slowly, and remain several weeks or even months. They often occur in individuals enjoying the most perfect health, but sometimes appear to depend on a particular state of the system, such as that which occurs on the approach of the menstrual period, and during pregnancy. Violent excess may sometimes occasion their appearance, but they have often a connection with disease of the digestive organs. They occasionally occur upon the face of pregnant women, covering it with a kind of mask.

The patches of ephelis, at first small, increase slowly, and attain a size varying from that of a sixpence, or less, to that of the palm of the hand. These patches, being separated by intervals of healthy integuments, give the skin a very peculiar appearance. But at a later period they coalesce and cover extensive continuous surfaces with a single coloured patch, in the breadth of

which here and there some spots of healthy skin are seen, which, at first sight, appear like so many morbid stains. These patches are usually attended with itching, which is increased by exposure to heat, by slight moral impressions, by indulgence in spirituous liquors, and by scratching: sometimes, though rarely, slight cuticular desquamation takes place.

The two latter symptoms distinguish the patches of ephelis from pityriasis versicolor, in which there is no pruritus and much desquamation. The red copper colour of syphilitic blotches will always prevent their being mistaken for ephelis; and if, in some rare cases, the yellowish cast of a patch of nævi should cause any doubt, the duration of the latter, and the knowledge of its being congenital, will soon clear up the mystery.

Treatment. The patches of ephelis readily disappear by the use of the sulphurous water bath, with or without the internal use of the same remedy. The waters must first be taken mixed with two thirds of barley-water or milk, and their quantity increased by degrees. When the itching is very troublesome, a lotion containing one ounce of sulphuret of potash dissolved in two pounds of water may be frequently applied. Gentle aperients may be at the same time administered, and all stimuli strictly forbidden.

NÆVI.

Syn.—*Maculæ maternæ; Mother Mark; Spilus; Mole; Envies.*

UNDER the common title of Nævi, two very different forms of congenital affection of the skin are included. The one, termed also spili, nævi pigmentares, or mole, is met with on all parts of the body, is of various sizes, and cannot be considered as a disease of the skin. The other, nævi vasculares, mother mark, is owing to an original morbid condition of the vascular system of the part affected. Of these, some are quite superficial, often met with on the face, and are of the colour of claret or port wine. They remain indolent, and appear to be formed by a simple dilatation of the arterial and venous vascular vessels distributed to the part of the skin affected. Others are somewhat elevated, and of the same deep red colour; these are of a far more dangerous nature, and are formed of erectile vascular tissue. Their size is very various; sometimes a small speck not bigger than a pin's head, and of a bright red colour, rapidly acquires such dimensions as to render it necessary to have recourse to a surgical operation. The treatment of the vascular erectile tumours is, indeed, altogether surgical.

VITILIGO.

Syn.—*Achroa; Achrome vitiligne* (Alibert).

VITILIGO is a partial colourless state of the skin, either congenital or accidental, occurring in irregular white patches of various extent. It occurs frequently among negroes, and occasionally among whites. The vitiligo hydropicorum, gravidorumque,—a term given by Frank to the small white lines which are seen upon the abdomen of females after delivery,—or those which succeed to ascites, are not real patches of vitiligo, but small lacerations of the corpus mucosum, induced by the distension of the parts. The patches of vitiligo are white; and when they occur on parts naturally covered with hair, these are also white. It is not uncommon to observe vitiligo upon the scrotum. In aged persons, these patches acquire sometimes considerable extent; they never cause pain, heat, or itching, and require no treatment.

PURPURA.

Syn.—*Land Scurvy*; *Hæmorrhæa petechialis*; *Hemacelinose*; *Hæmorrhée*; *Petechia*; *Morbus maculosus hæmorrhagicus*; *Peliose* (Alibert).

Purpura is a disease of the skin characterised by patches of various extent, sometimes of a bright red, sometimes of a dark livid tint, the colour never disappearing under the pressure of the finger. These patches occasionally only consist of minute spots; but frequently they are several inches in width. They are usually met with on the skin alone; but in other cases they appear simultaneously on the mucous membranes, in which case they are sometimes accompanied with more or less hæmorrhage.

Willan distinguishes five species of purpura, viz. *P. simplex*; *P. hæmorrhagica*; *P. urticans*; *P. senilis*; *P. contagiosa*. In the description of the two first, that of the third and fourth is included, and ought not to be separated merely on account of some slight attending circumstances. The purpura contagiosa is an accidental symptom, which sometimes appears in typhoid fevers, and cannot be separated from the history of those diseases.

The *purpura simplex*, the petechiæ sine febre of some writers, occasionally appears without any derangement of the functions; it is sometimes preceded by slight uneasiness and a little giddiness. The patches are of a light red at first in young subjects, and darker in those of more mature age; they are distinct, irregularly circular, and of small extent. The eruption usually occurs in the night, and is only perceived the next morning; other patches appear successively, so that although they are few in number at first, they become more numerous within a few days. The extremities, and especially the thighs and legs, are the parts commonly affected; the eruption comes out later on the arms, and almost always in a lesser degree. Generally, successive patches appear; hence, while the first fade, fresh crops are evolved, and others are seen in the middle of their course. The duration of the purpura simplex varies from between three or four weeks, to one, two, or several years. The patches last six or eight days, sometimes a fortnight. Shortly after they come out, they grow first darker and livid, then yellow, and gradually disappear.

The *purpura hæmorrhagica* is the same disease, only the patches are of greater extent, because much more blood is extravasated. It is not constantly preceded or accompanied with any marked disturbance of the system. The patches are more numerous, and dark-coloured; and amongst them there are several broader than the others, and of a more livid red, and, again, others which resemble recent contusions. Occasionally, the cuticle upon some patch is raised into blebs or blisters filled with liquid blood. When the case is still more severe, extravasation of blood takes place also upon the mucous membranes of the lungs, or of the stomach and bowels; and hæmorrhage, to a greater or less amount, may occur, either by constant oozing, or by a more rapid discharge; in which latter case, patients have been known to sink rapidly.

This variety sometimes appears in the midst of perfect health; but it is also often preceded by transient pains in the limbs, and by a state of depression, and great inaptitude for either bodily or mental exertion. These latter symptoms almost always accompany the appearance of the purpura hemorrhagica. The pulse varies remarkably in its character, being in one case small, weak, and easily compressed; in another, full and hard. This variety may end in a few weeks, or be protracted for several months: Bateman has seen it last several years.

The *causes* of both varieties are very obscure. Some persons are very much predisposed to this disease, and this predisposition may be hereditary. Those families are known in Germany by the name of *bluters*. The disease appears to occur more frequently in females, and young persons before the age of puberty. It attacks individuals in the enjoyment of apparent good health,

almost as often as persons of weakened constitution. The purpura simplex is often met with in summer.

Diagnosis. The circumstances in which purpura appears will always suffice to distinguish it from scurvy. The small dark red spots of purpura simplex are readily distinguished from fleabites, by the central point or bite of the latter.

Treatment. In *purpura simplex,* when the subject is young and strong, and the disease has appeared after violent exercise or any excess, venesection, strict regimen, tepid baths, and rest, with some gentle aperient, are to be employed. But in persons of spare habit, weakly constitution, and lymphatic temperament, the treatment must be tonic, consisting of the diluted mineral acids, with a little old wine or good malt liquor. Alcoholic fumes have also been of service.

The *purpurahæ morrhagica* is a far more serious disease. Bleeding is generally to be avoided, and purgatives with the mineral acids administered. Calomel, spirits of turpentine, jalap, or castor oil in large doses, appear the most useful remedies. The drinks should be iced, and the regimen tonic, but not too exciting.

PELLAGRA.

Syn. — *Dermatagria; Ichthyosis; Erysipelas periodicus nervosus chronicus; Scorbutus Alpium; Malattia di Miseria.*

Pellagra is an endemic disease, which has been only observed in particular parts of Lombardy; and those who are affected with it receive from the Italians the name of *pellagrosi.* This affection is a symptomatic eruption, depending on constitutional disorder or on derangement of the digestive organs. It is not contagious; and is rarely met with but among the very poorest classes: all ages are attacked, and females appear rather more subject to it than males. Chiappa considers the extreme misery of the peasantry of Lombardy to be the true cause of this endemic disorder, which is always chronic in its progress, and generally lasts for several years. M. Briere de Boismont, who has carefully studied this disease in the large hospital of Milan, distinguishes three periods in its course, which, however, are not always distinct.

Constitutional disturbance, such as a feeling of depression, both mental and bodily, headach, giddiness, anorexia, pains in the epigastric region, and diarrhœa, always precedes the disease of the surface, and occurs in the spring. The cutaneous affection begins on the parts exposed to the heat of the sun, and is named by the Italians *erythema solare.* Small red spots or patches appear upon the back of the hands, on the face and forehead, neck and breast, and exposed parts of the legs and feet: these red patches, which are at first shining, are soon covered by epidermic squamæ, similar to those of psoriasis. Beneath these scales, the skin becomes rough, thick, and chapped. The disease of the skin generally disappears in the autumn; but the general health is not restored, slow fever and diarrhœa continuing after its decline. The general and local symptoms of pellagra return the ensuing spring, with renewed violence; the weakness and depression are more marked with diarrhœa, cramps in the legs, and other spasmodic symptoms. The disease of the skin again occurs with still greater severity; and larger patches, similar to those of the psoriasis inveterata, cover the diseased parts. During the autumn, the symptoms again decline; but later. In the third year, spring again renews the pellagra. The weakness is very great, and the limbs, worn out with pain, can scarcely sustain the miserable patient. The diarrhœa continues, or passes into decided dysentery; the lower extremities become anasarcous, or effusion of fluid takes place into the abdominal or thoracic cavities. The spasmodic symptoms increase; not only giddiness, but decided fits of an epileptic character, occur, and the patient frequently becomes idiotic or insane.

The disease thus goes on for some years getting worse and worse, until the

patient, worn out with colliquative diarrhœa and general suffering, sinks into the grave. Curative measures appear to have little influence in arresting the progress of pellagra: warm baths and general dietetic means seem to have been of some efficacy; but the most necessary step is a removal from the causes from which the disease most evidently originates; this however is not often in the power of the physician to accomplish.

RADESYGE.

Syn. — *Lepra Norvegiana; Spedal Sked; Salze Fluss.*

THIS disease, which appears to be peculiar to certain sea-coast districts in Norway, was described in 1797 by Messrs. Mangor and Arbo. Much, however, is still wanting to enable us to form a precise and accurate opinion of its nature and real character. It seems, indeed, by their description, to comprehend two very different forms; the one commencing with small, hard, red, cutaneous tubercles, soon followed by the formation of thick, hard scales, without ulceration: the second appears in the shape of subcutaneous tubercles, preceded by insensible erythematous patches. These tubercles ulcerate sooner or later, and deep-destroying sores supervene.

The *causes* of the radesyge appear to be very similar to those of pellagra, in the unhealthy and miserable mode of living among the poor, who subsist almost wholly upon fish often half putrid. Their beef, pork, milk, butter, and cheese are furnished by animals fattened upon fish, often in a state of putrefaction. Their drink is snow water, sometimes mixed with sour milk; and rarely do they partake of vegetables. Their dwellings are cold and damp; and their dress, besmeared with train oil, is often worn without change for weeks and months together. The radesyge appears in some cases to be infectious, nurses being sometimes known to communicate it to their infants, and the latter to a new nurse. On the other hand, the wife has been affected, whilst the husband, who lived and cohabited with her for years, has remained healthy and sound. In some villages, almost every person is attacked to a greater or less degree, and in those cases it is evidently endemic. The poor peasantry and fishermen are the principal sufferers. Both sexes are equally liable to it; but grown-up persons more than children.

According to the description of the radesyge given by Messrs. Mangor and Arbo, it has always a chronic character, and appears in two widely different forms, — the one occurring in the shape of tubercular tumours, which open and produce deep foul ulceration; in the other, in which there is no discharge, thick grey scales cover the greater part of the integumentary surface. Perhaps two different diseases have been confounded in their description, the one partaking of the nature of tubercular leprosy, and the other of that of psoriasis.

In the one or the other form, the radesyge may be local, and continue so for years without spreading further. In those cases, thick scaly incrustations cover the affected parts, or else one or several tubercles appear, ulcerate slowly, and are followed by a foul sore, which eats deeply. Thus a tubercle sometimes appears upon the roof of the mouth, and, ulcerating, destroys, sooner or later, the os palati, uniting the mouth and fossæ nasi in one continuous cavity, whilst the general health of the patient remains unaffected. But far more generally, symptoms of more or less constitutional disorder precede the cutaneous affection. Three periods may thus be observed in the progress of the disease: —

1. Weariness, and inaptitude to bodily exercise, headach, stiffness and flying pains in the limbs, coryza, a sallow dirty complexion, which, when the patient is warm, changes into a dark red glow of the face, and in cold weather into a dark livid hue. This coloration of the face is considered to be the surest symptom that the radesyge is on the point of appearing; and another is, the thickness and oily nature of the matter of the perspiration.

2. The above-described symptoms increase; and, generally, insensible erythematous patches of various extent, and of a brownish red and irregular form, with somewhat elevated borders, precede the evolution of small hard livid tubercles, which appear upon the face or the body. Their size is at first that of a small pea. They are readily moved with the finger; but they afterwards increase in size, and appear to be incorporated with the integuments. These tubercles remain indolent for a certain time, but at last they open and discharge a vast quantity of ichorous fluid, followed by a very sensible diminution of the pains, headach, oppression, and other general symptoms. When these tumours are small, superficial, and few in number, they often disappear in winter, and return in summer. After the discharge, thick, grey, scaly incrustations cover the affected parts; and this state of things may go on for five or six years, especially when the patient is strong and young.

3. In this stage tubercles have evolved on the greater part of the surface, and deep ulceration has succeeded. Grey scales, sometimes a quarter of an inch thick, cover large continuous surfaces: the skin appears so much thickened as to have been compared to leather. Motion is impeded, and the patient is obliged to keep to bed: there is much thirst and fever, and the appetite is voracious. Violent and continual pain, with severe and unremitting diarrhœa, usually brings the sufferer to the grave. Sometimes, parts of the hands and feet are detached by deep ulceration.

When no discharge or ulceration takes place, thick dry scales cover the whole body, and impede progression. The gums swell, and the breath, perspiration, and saliva, become so very offensive, that the whole house is infected

The *treatment* appears to consist principally in the administration of proper food, and other hygienic measures, with tonic medicines. Sudorifics, narcotics, and the corrosive sublimate, appear to have been useful, with application of the black wash to the sores, and the administration of pills composed of calomel, opium, and extract of guaiac, in purgative doses. Salivation must be carefully avoided.

ELEPHANTIASIS ARABICA.

Syn.—*Barbadoes Leg; Galle Leg; Andrum; Dal Fil; Glandular Disease of Barbadoes; Sarcocele d'Egypte; Eolica Japonica; Lepre Elephantiasis; Lepre tuberculeuse elephantine; Pêdarthrocace* de Kœmpfer; *Elephantiasis Tubereux* d'Alibert.

The Arabian elephantiasis is characterised by an indolent, permanent, hard enlargement of the skin and subjacent cellular and adipose membrane usually affecting one of the lower extremities or the scrotum. No part of the body is however exempt; the face, neck, breast, abdomen, nates, labia and margin of the anus, have at different times been observed to be its seat. But the lower extremities are principally affected; and from their enormous size the denomination of the disease has been given. It is not contagious, and does not appear hereditary. Males and females, rich and poor, appear indiscriminately attacked. It is met with principally in the West Indies, in some parts of which it is endemic, in Egypt and the coast of Africa. It is uncommon in Europe. We have seen it in France attack a German beggar in the scrotum, and ultimately cause his death.

Although the progress of the disease is slow, there is more or less general disturbance at the beginning, such as fever, frequent vomiting, pain and erythematous redness over the course of the lymphatic vessels, with swelling of the limb or part. This never subsides entirely, and increases with each returning attack of constitutional disturbance, which intermits and returns at irregular intervals. The limb gradually increases to an enormous size, and becomes so hard as to resist the firmest pressure. In a few months the general symptoms and local pain disappear; but the distended and enormously swollen

part, whether the leg or the scrotum, not only remains in that state, but increases: the scrotum has been known to weigh nearly sixty pounds, and one of the lower extremities to attain a weight equivalent to that of the rest of the body. The skin, at first pale, smooth and shining, becomes rough, hard, thickened, and covered with scaly incrustations of various thickness; it afterwards cracks in all directions, and deep and painful fissures ensue. The lymphatic glands, which were from the first hard and swollen, sometimes inflame and suppurate, and even mortify. Deep abscesses form, and discharge a large quantity of fetid pus, and death occurs with the ordinary symptoms of adynamic fever.

Treatment. In the first stages of the disease, local and general bleeding may be necessary, with rest and the horizontal posture of the limb. At a later period, gentle and frequent friction, compression carefully applied, daily shampooing, and the vapour douche, may be employed. Frictions, with the different preparations of iodine, are of great service; but should inflammation come on, their use must be immediately suspended.

THE ALEPPO EVIL, OR MALUM ALEPPORUM.

Syn.—*Il mal d'Aleppo; Bouton d'Alep.; Habt il Senne, or Btch of a Year; Haleb Choban, or Aleppo Ulcer (Turkish).*

This disease, which is peculiar to Aleppo and the neighbouring villages seated on the rivers Coick and Sejour, is characterised by the evolution of one or several tubercles, which usually occur on the face, suppurate in the course of three or four months, and heal generally at the end of a year, leaving an ugly-looking cicatrix. Among the inhabitants of Aleppo the disease almost always appears upon the face, but when it attacks strangers it usually appears upon other parts. Its duration varies, and its causes are unknown. It has been known to last for several months, and occasionally for years. In some cases, there is only one tubercle, which is known by the name of the *male tubercle;* in others there are several large ones, and around these a number of small ones, — this variety the Aleppians call the *female tubercle.* MM. Guilhon and Legasquie, who travelled through Syria in 1829, have observed upon a Frenchman seventy-seven large tubercles, surrounded by a great number of smaller ones, which gave the eruption the appearance of confluent small-pox.

The Aleppo evil appears in the shape of an indolent tubercle, without general symptoms or local pain; and increases in size, without rising very high, for four or five months. Suppuration then begins; the tumour becomes painful, and ulcerates, discharging a thick purulent matter, which is at first without any unpleasant smell, but soon exhales a disagreeable stench. When this matter dries, a thick white moist scab forms, which sometimes remains, but generally falls off, and is replaced by others. The ulcer is superficial, uneven, and of a bright red colour, varying in diameter from half an inch to three or even four inches. The period of ulceration generally lasts five or six months; the discharge then decreases, a dry adherent scab forms, and cicatrisation takes place at the end of the year. The cicatrix is commonly white and superficial, but sometimes deep, rough, and of a brownish hue. Sometimes part of the nostrils, or of the outer ear, is destroyed by the ulceration.

In Aleppo, all ages, both sexes, all professions, the healthy as well as the sick, are equally attacked; but when it occurs in scrofulous constitutions it usually lasts much longer. According to M. Guilhon, no inhabitant of the town ever reaches his tenth year without being affected with this evil, and marked in the face. It never occurs more than once in the same individual; it is not contagious. Mr. John Russel attempted in vain to inoculate it, in order to prevent the face from being attacked. Strangers who dwell in Aleppo are almost always affected sooner or later with this disease, the exceptions being very uncommon. The Aleppo evil occurs even on those who have left the country for several years: thus an English merchant, who passed through Aleppo, was several

years after attacked with the disease in London: it was unknown to the medical men to whom he showed it, but Mr. Russel, then above eighty years of age, immediately recognised it as the Aleppo evil. In later times, a French merchant, who had lived twenty years in Aleppo without being attacked, was affected by it at Marseilles a few years after his return from Syria. The dog is also subject to this disease, and the same appearances are observed.

The *treatment*, according to M. Guilhon, consists in emollient applications, cleanliness, and avoiding exposure to the air. The various methods employed by the Syrian physicians and others, he considers to be useless, and even hurtful. Mr. Russel however found the common mercurial plaster of great service, when applied early, and left for a long time upon the tumour; and M. Salina assures us that he has always succeeded in stopping the progress of the disease, by employing the actual cautery long before the period of suppuration. When ulceration has taken place, the latter physician advises the use of an ointment composed of camphor, litharge, vinegar, and cerate; and, as an emollient application, the pulp of cassia moistened with rose water.

LEPRA ASTRACHANICA.

Syn. — *Morbus Tauricus; Morbus niger.*

Gmelin and Pallas (Reise durch Ruszland) mention under these denominations a singular cutaneous disease, which appears to be endemic on the mouths and banks of the river Wolga. We merely mention this malady in order to direct the attention of those members of the profession who may have opportunities of observing it, and of investigating its real nature and character, which, from the description of the above-mentioned travellers, appears to be somewhat similar to the Greek elephantiasis, or lepra tuberculosa.

The state of misery of the poor peasantry and fishermen, together with the damp, swampy situations of their dwellings, and the unwholesome nature of their food, which is principally fish, raw and salt meat, are considered the exciting causes of this disease.

Lepra Astrachanica first appears in small, elevated, dark, livid, red patches, or of small flat, insensible tubercles, which come out on the face, the chin, and on the joints of the hands and feet. These tubercles remain indolent for about two years, when they increase in size, and turn black; the disease at this stage is termed the *black disease* by the Jaikish Cossacks. The patients now complain of pains in the limbs, the voice grows hoarse, the face swells, and the whole integumentary surface becomes hard, rough, and scaly, whilst the colour of the skin changes to a dark brown red. Towards the fifth year, the tubercles begin to suppurate, and those on the feet first. Foul ulcers succeed, which discharge a fetid ichorous fluid. Some heal, and again open afresh. Large thick scabs are formed upon the ulcerated surfaces, and there is much itching. The ulcerations beneath are sometimes very deep, and fingers and toes are often detached. In the sixth year, the disease penetrates still deeper, and the lips, the gums, and even the tongue, are sometimes destroyed. The hair falls off, and the nails are altered in their shape and texture. The voice grows more hoarse, the pulse weak and quick, the appetite is still good, but the patient has no venereal passion. Diarrhœa and cough supervene, and the victim is usually carried to the grave with symptoms of ulceration in the intestines.

Treatment. When the disease has lasted for several years, every mode of treatment fails. On its first appearance the manner of living must be changed, and another climate resorted to. The Cossacks, according to Gmelin, praise the virtues of the anabasis aphylla for the cure of this disease. Arsenical preparations would probably be far more efficacious.

SYPHILIDA, OR SYPHILITIC ERUPTIONS.

UNDER this head are included all the different cutaneous eruptions which appear as the consequence of syphilitic infection, occurring in one of the following forms, viz. the exanthematous, vesicular, bullous, pustular, papular, squamous, or tubercular.

The primary venereal ulcer, or chancre, as it does not belong to any of the above elementary forms is not included among the syphilitic eruptions. Indeed, as far as ocular inspection can discover, this primary form of venereal infection is never pustular or vesicular, nor preceded by any rising of the cuticle or epithelium; it is an ulcer from its very commencement: at least we have never seen it otherwise; and M. Biett, whose accurate knowledge in all matters of cutaneous disease is universally admitted, and who has most carefully examined several hundred cases of chancre at their earliest stage with the best magnifying glasses, fully asserts and maintains this opinion.

Syphilitic eruptions are sometimes, though rarely, primitive, and when they are, they accompany the primary symptoms, or appear very shortly after the infection. In some rare cases, these eruptions are, indeed, the only symptoms of the venereal poisons. Most commonly they are secondary, and occur sooner or later after the disappearance of the primary symptoms,—in some cases immediately, in others several weeks or months, or even many years after.

They usually exhibit the chronic character, but where primary they are sometimes acute, especially the exanthematous form. They occur at all ages, from the infant who suffers for the parent's fault, to the elderly subject who has long forgot a disease which occurred twenty or thirty years before.

The various symptoms of syphilitic eruptions may be ranged under three heads: 1. Those which are common to all these eruptions; 2. Those peculiar to each particular variety or form; and 3. Those symptoms of general and decided constitutional infection which too often destroy the sufferer.

Syphilitic eruptions have certain characteristic features in common, which distinguish them clearly from cutaneous affections of like elementary forms, but developed under the influence of ordinary causes. Of these the most remarkable is the reddish yellow or copper colour, which is darker in the more chronic forms, and of a lighter shade in the more acute, but which never has the characteristic red of ordinary inflammation. The form presented by the eruption in the smaller patches, as well as in those clustered together, is almost always circular. The scales are thin, dry, and of a light grey colour; the scabs are hard, thick, of a dark greenish or black colour, and furrowed on the surface. All parts of the skin may be affected, but generally these eruptions make their appearance on the forehead, the face, and particularly on the alæ of the nose, the back and the shoulders. We have observed that the hands and wrists are rarely attacked. Generally speaking the skin of the patient is sallow and exhales a disagreeable smell. Cold appears to favour the syphilitic eruptions, and heat to lessen their occurrence. When they take place, and are even very general and rapidly formed, very slight constitutional symptoms attend their appearance.

The symptoms of syphilitic eruptions vary according to the peculiar character of the cutaneous disease.

1. The *exanthematous* is primitive and acute, or secondary and chronic. The first (*Roseola syphilitica*) appears in the form of small, rather confluent, irregular, pale red copper-coloured patches, slowly disappearing under the pressure of the finger. These patches, which usually occur on the trunk and extremities appear spontaneously, often in a single night, without any constitutional symptoms, and are accompanied with a slight degree of itching. They accompany primary venereal symptoms, particularly gonorrhœa, and are often evanescent, disappearing in a few days; but in some cases they are more permanent, and fade slowly, leaving behind them a grey cast, which sometimes remains

for several months. We have however seen the roseolous rash appear several years after a primary venereal infection. In these cases, the eruption always appeared to be induced by some acute moral impression, or by some excess, or by imprudent indulgence in bathing. The eruption appears slowly, and may last for months. Syphilitic roseola is distinguished by its dingy and coppery hue from simple roseola, the patches of which are of a bright rose red colour.

The second variety of exanthematous syphilitic eruption always occurs long after previous venereal infection, and is commonly known by the name of *syphilitic blotches*, or *maculæ syphiliticæ*. Their most common seat is the forehead, face, breast, and arms, but they may show themselves on almost every part of the body. The patches, which appear slowly, are sometimes of an irregular form: they are generally circular, of a very dusky red copper colour, never confluent, and disappear incompletely on pressure. Their size varies between that of a silver fourpenny to that of a halfcrown piece; occasionally a slight degree of epidermic exfoliation takes place on their surface, accompanied with a little itching. Their appearance is not attended by any marked general disturbance. They never ulcerate, and if sometimes scabs have been observed upon them, they have succeeded to some occasional pustules. They disappear slowly the change being first perceptible in their centre. The coppery colour of this eruption always indicates its true nature: it sometimes exists alone, but is almost always complicated with one or the other forms of syphilida.

2. The *vesicular* syphilitic eruption is very rarely met with. Slight anorexia and trivial general symptoms precede the eruption when extended over the greater part of the body. It consists of small transparent vesicles, surrounded by a distinct coppery areola, of slow progress, without pain, itching, or perceptible increase of heat. Some of these appear, whilst others dry up. In several, the serous effusion is absorbed; in others it becomes opaque, forming small thin flimsy scales, which detach sooner or later, but always leave a coppery injection of the skin and all the characters of a syphilitic stain. In a case of this kind at the hôpital St. Louis, on careful inspection of the fauces, we observed a rounded ulceration, with sharp cut edges and a greyish bottom. The patient, a young female of sixteen, denied all possibility of infection; but a pustular syphilitic eruption, which covered the whole body a month afterwards, cleared up the doubt, if any existed. No mercurials had been employed, because M. Biett waited on purpose to see if other more decided symptoms appeared.

3. The *pustular* syphilitic eruption is one of its most frequent forms. This variety is characterised by small tumours, filled with ichorous matter, on a dusky red copper-coloured base. These pustules are generally succeeded by crusts formed by the concretion of the fluid they contained, and sometimes leave a grey patch, sometimes a cicatrix, and often an ulceration. There are several varieties of these pustules; in some cases they are small, of a conical shape (*psydeacia*), and placed on a hard basis, surrounded by a copper coloured areola, appearing most commonly on the forehead and face, in successive crops, often in great numbers, and clustered together. They go through their different stages slowly. The fluid they contain concretes into minute scabs of a greyish yellow colour, which usually only leaves a coppery mark, but sometimes a small round cicatrix, about the size of a pin's head, with a central depressure. These pustules rarely ulcerate: this only happens when several have coalesced. Sometimes they occur in great numbers on the legs; and the dark coppery areolæ which surround them coalescing, they form large patches of a dark livid purple hue, which are occasionally rendered darker by the slight ecchymosis that occurs. When thus clustered together ulceration more frequently occurs.

Another form of the pustular eruption is characterised by larger pustules (*phyzacia*), commonly isolated, not very prominent, but flattened and apparently depressed in the centre. These are sometimes numerous, and occasionally attain the size of a split pea: their base is hard, of a deep coppery hue, and they

contain a little purulent fluid, of which the yellowish white colour is striking on account of the dark surrounding tint. They appear commonly on the face, chest, and extremities; and the fluid they contain dries up into a dark brown scab, to which usually a cicatrix succeeds, although sometimes only a livid stain or a small chronic induration. It however sometimes happens that the inflammation runs higher, that the purulent fluid is more abundant, and that several of the pustules coalesce. When these break, their contents, concreting upon the diseased surfaces, form thick greenish crusts, which adhere firmly, and appear to penetrate into the depth of the cutis, whilst a broad areola of a dark livid coppery hue surrounds them. These incrustations are constantly succeeded by deep ulcerations, to which follows the irregular characteristic syphilitic scar.

The pustules may be still larger than those we have just mentioned, and appear similar to those of ecthyma (*Ecthyma syphilitica*), from which they differ in various points. These pustules are commonly met with on the extremities and, principally, on the legs; they are distinct, and few in number, and first appear in the form of a dark livid stain, about the size of a shilling or more. The cuticle is soon distended by the effusion of greyish sero-purulent fluid beneath, and the whole patch appears swollen. The small tumour increases slowly in size, and is surrounded by a broad areola of a copper colour; whilst that which surrounds ecthyma is of a deep purple red. Within a few days the pustule opens and discharges a thickish fluid, which, concreting, forms a black and very hard scab, that grows gradually thicker, and is generally of a circular form, with circular furrows on its surface. Whilst this process is going on there is little pain or heat; but the scabs are very adherent, and often remain a great length of time without falling off. When this occurs, either naturally or by the help of emollient poultices, round deep ulcerations appear, with sharp-cut hardened livid edges, and a grey sloughy bottom. These ulcerations increase in size, and the scab again forms slowly; the disease thus goes on, until by appropriate means its progress is checked: the surface then presents a more healthy appearance, and the affected parts are covered by round indelible cicatrices. This variety of syphilitic eruption is often observed on infants with congenital syphilis.

Sometimes the skin which surrounds the nails becomes the seat of pustular syphilida, and pustules occasionally form beneath them. To these succeed ulcerations, which cause the nails to fall off. They again grow slowly, but are small, narrow, rough, grey, and brittle. The inflammation is sometimes severe and the pain very great. All these varieties of pustular syphilitic eruptions are generally secondary. The latter approaches nearly to the bulbous form, and might be considered in some cases as *rupia syphilitica*, whilst others closely resemble ecthyma.

4. The *papular* syphilitic eruptions appear in the form of small, hard, solid, slightly prominent elevations, which do not contain fluid and are not succeeded by ulceration, disappearing by resolution or desquamation. They occur in two different forms, the acute and the chronic. In the first or acute form (*lichen syphiliticus, scabies venerea*), the papulæ are very small, slightly conical in shape, closely crowded together, and surrounded by dusky red areolæ occasionally blended together.

These papular eruptions generally cover the whole surface of the body, but the face is most thickly beset. They appear almost simultaneously, and not successively, and the eruption is completed in twenty-four or forty-eight hours. Their evolution is seldom attended by marked constitutional symptoms; we have however observed in some cases slight fever, general uneasiness, with incessant itching. These papular eruptions often accompany gonorrhœa, or appear very shortly after its cessation. This variety of syphilitic papulæ usually disappears after a certain period by resolution or desquamation; or sometimes they become excoriated on their tips, and discharge a small quantity of fluid, which, by concreting, forms thin incrustations, which are never succeeded by cicatrices.

In the second or chronic form, which is the more common form of syphilitic

papular eruption, the papulæ are generally numerous and distinct, about the size of a split pea, broad and flat, of a circular shape, well-marked copper colour, and slightly elevated above the surface of the skin. They are slowly and successively evolved, but not attended by itching or pain, and seldom or never surrounded by any areola. They appear on the outer aspect of the limbs, and also very commonly on the forehead and the hairy scalp. Their appearance often coincides with that of some other syphilitic eruption, particularly the pustular form; and they always disappear very slowly, terminating in resolution with a pellicular desquamation from their summits. These pellicles fall off and are incessantly renewed, until the papulæ, gradually contracting in size, sink to the level of the surrounding skin, leaving, as usual, small greyish stains, which disappear very slowly. When the papular eruption covers the whole surface, the intervals between the papulæ are concealed by the pellicular desquamation, so that the disease may seem at first sight to be of a squamous nature. These eruptions are seldom attended by general symptoms.

5. The *squamous* syphilitic eruptions are characterised by smaller or broader copper-coloured elevations, covered with thin dry scales. The forms of these eruptions are similar to those of the different varieties of psoriasis; they are almost always a secondary syphilitic symptom, and of decidedly chronic character.

When the eruption assumes the form of lepra vulgaris (*psoriasis orbicularis*), small papular-looking copper spots appear without pain and with little itching; they are soon covered with thin dry scales of a greyish colour, which increase in number, and soon form distinct circular patches, with elevated borders and apparently depressed centres. The borders are formed by numerous small copper-coloured elevations, which do not coalesce so as to form a continuous surface; each of these elevations is partially covered on its surface, with a hard, dry, grey-coloured scale which does not cover its apex. The middle of the circles appears perfectly healthy. This variety occurs principally on the forehead and on the neck. It seldom ends in ulceration but generally in resolution, and leaves dusky or livid red stains in the situations it occupied long after the circular patches have disappeared. The lepra syphilitica is almost always a secondary, very rarely a primary symptom. M. Biett has, however, once seen it appear very shortly after the primary disease.

A most remarkable form of syphilitic lepra is that in which the patches present a very dark grey, almost black colour, which is probably the reason of its being often mistaken for the lepra nigricans. The patches in this form are exactly circular, about half an inch and even more in diameter, raised around their margin, depressed in their centre, and of a very dark, almost black colour, which is still more remarkable in the middle of the patches than in the raised margins. The scales which cover these are thin, dry, apt to split, and but slightly adherent. These patches are sometimes very numerous, and appear on all parts of the surface. This, however, is a very rare variety. A far more common form of squamous syphilitic eruption than the annular psoriasis, is that which occurs with the external characters of psoriasis guttata. The patches in this variety are generally isolated, distinct, irregularly circular in shape, slightly raised above the general level of the integuments, and covered with thin, hard, greyish coloured, and pretty firmly adhering scales, which cover, not as in the psoriasis guttata, red, furrowed elevations, but smooth, shining eminences of a copper tint. A diagnostic character of much value, and on which M. Biett places great reliance, is a small white rim which surrounds the base of each patch, at the very point where it rises above the level of the skin. This white rim, adherent to the base, is formed by a slightly detached and torn exfoliation of cuticle. The patches are usually evolved successively upon the arms, breast, back, forehead and face, and occasionally extend to the scalp; sometimes, however, they occur on one of these regions only. They make their appearance in little points of a coppery hue, which become covered with these dry grey-coloured squamæ, and, at their height, vary in size from that of a

split pea to that of a shilling, or more. Sometimes, though rarely, the patches coalesce, and form continuous large broad patches of some extent, of a coppery red colour, and covered here and there with small thin, dry scales, bearing a certain resemblance to most of the external features of psoriasis diffusa. The squamous syphilitic eruptions may also attack the hands and feet, assuming characters very similar to those of the psoriasis palmoria. Their copper-coloured appearance, and the actual presence of other eruptions of the same nature on other parts, sufficiently distinguish them. One remarkable feature of this form, much insisted on by M. Biett, is the presence of a hard, round, horny substance, very deeply seated in the middle of the patch.

6. The *tubercular* syphilitic eruptions are very common. The tubercles, at first small, acquire various sizes, from the dimension of the head of a pin to that of a split walnut; their form is conical, flat, or round; they are occasionally isolated, but usually clustered together, and often form regular circles, which we consider to be the lepra syphilitica. These syphilitic indurations may remain a very long time indolent, and always exhibit a smooth shining surface; in other cases a constant desquamation occurs, and in many they become the seat of various sized ulcers. These tubercular eruptions appear on all parts of the surface of the body, but particularly on the face; the nose and commissures of the lips being most frequently attacked. We have seen the whole surface of the body covered with it.

The various forms of the tubercular syphilida may be reduced to the following. The tubercles are sometimes arranged side by side, with little space between them, so as to form perfect circles of varying diameter, and healthy centres. This is the lepra syphilitica. At other times the tubercles are of a larger size, clustered together without any regular order, on surfaces of various extent. They are very prominent, of an oval shape, and about the size of a small olive or gooseberry. Their summits are smooth and shining, and do not desquamate; they often remain stationary for years, and never, or very rarely indeed, ulcerate. This variety is met with on the face, and principally on the cheeks and tip of the nose. It is always a secondary form of syphilis.

The syphilitic tubercles frequently form very large, round, isolated tubercles, few in number, of a deep, livid, red colour, surrounded by a coppery areola, which are principally seen on the upper lip and nose, where they remain stationary for an uncertain time. At a later period, they become painful, swollen, and surrounded with a peculiar livid erythematous patch, and ulcerate on their summits, where a thick scab soon forms. The ulcer beneath spreads, in depth and in surface; other tubercles appear near the first, the progress of which is more rapid; the ulcers blend together, and a thick scab covers the whole surface. In this manner one of the alæ of the nose, or part of the upper lip, is often destroyed. These cases must not be confounded with those ulcers which destroy, not only the nose, but its cartilages and bones; the former commence in the mucous membrane, and the skin is destroyed when the parts beneath are irrevocably lost.

Tubercles of syphilitic origin may acquire a still larger size, equal to that of a split walnut. These are met with dispersed over different parts of the body, and especially on the back. They are hard, round, and of a dusky red. They remain indolent for a time, but sooner or later some of them ulcerate on their summits. The ulcer, after destroying the tubercle, invades the surrounding parts, and proceeds, not in extent of surface, but in spiral and curved, sometimes circular lines, frequently healing in one part whilst it advances on the other. These linear ulcerations are superficial, only a few lines in breadth, and are covered with thick, hard, black, adherent scabs, which leave indelible and characteristic cicatrices. These ulcers, which furrow the skin in all directions, give a most peculiar appearance to the diseased surface. Sometimes the eruption is of small extent, but we have seen it cover the whole surface of the body in a patient who had never taken one grain of mercury. Both these latter varieties are always secondary.

Another variety of tubercular syphilitic eruption, which sometimes appears

as a primary symptom, is characterised by flat, thick, round tubercles of various sizes. Sometimes they are about the size of a lentil; they occur in the cleft between the alæ nasi and the cheek, or about the commissures of the lips; in other cases, they attain the size and diameter of a shilling and several lines in thickness: they appear on the scrotum, thighs, pubis, and about the anus. Their colour is always of a red livid coppery hue. The scrotum is sometimes covered with this variety of tubercles, which are generally isolated. When situated around the anus, they sometimes appear to join by their circumference, and thus present a larger surface. After a certain lapse of time their surfaces appear chapped, and a small linear ulcer appears, which discharges a sanious fluid of a particular and very nauseous smell. These ulcerations never spread in depth.

All these various forms of syphilitic eruptions are very frequently complicated with each other; the squamous form, however, generally occurs alone. Other tissues also commonly present some syphilitic symptoms: indeed, the whole catalogue of venereal symptoms may appear simultaneously in those affected with syphilitic eruptions, but this is very uncommon; it is, on the other hand, very rare to meet with those eruptions without any other symptoms of lues. The following are the lesions which most frequently accompany syphilitic eruptions. Ulcerations in some part of the fauces, either on the tonsils, palate, or the mucous membrane of the posterior aspect of the pharynx. Pains in the bones of the extremities, skull and sternum, and of the larger joints; thickening of the periosteum; enlargement and caries of the bones, especially of the nose and palate. All these may appear in patients who had never taken one grain of mercury. Inflammatory affections of the eye, and particularly of the iris, so well described by Beer, Saunders, Wardrop, and lately by Lawrence, may also be enumerated. Another remarkable symptom which often accompanies these eruptions, is the formation of small, hard, moveable lumps under the skin, which are only troublesome at first; a slight livid swelling is perceived, though, when the humour is deeply seated, there is often no change of colour: the livid tint afterwards becomes deeper, the tumour more prominent, fluctuation supervenes, and ultimately the skin bursts, leaving a large ulcer with sharp cut edges.

Venereal eruptions may also be complicated with other diseases of the skin; thus we have several times observed eczema, herpes, and very often scabies accompany the pustulous or papulous form of syphilida. Alopæcia of the scalp is often produced by venereal eruptions.

The *cause* of syphilitic eruptions may be hereditary, and the disease may appear some time after birth; but generally they result from the introduction of the syphilitic poison into the system at a previous period. As to the use or abuse of mercury, the notion is altogether gratuitous and unfounded. On this subject M. Biett's authority seems to us unanswerable. During twenty-five years he has annually observed, on an average, from 500 to 600 individuals, gilders, silverers of mirrors, &c., who make use of quicksilver in their several trades, and who, on account of diseases induced by the action of this metal on their system repair to the baths of the hôpital St. Louis; but he has never seen one of these persons affected with ulcers in the throat, syphilitic eruptions, enlargement and caries of the bones, thickening of the periosteum, or any other symptom usually denominated syphilitic, and which have been supposed to result from the action of mercury upon the constitution: he has, on the other hand, in numerous instances, observed all these symptoms in persons to whom mercury had never been administered. All the observations we have hitherto made induce us to coincide with the opinion of M. Biett.

Syphilitic eruptions generally appear a long time after the primary symptoms without any apparent exciting cause, and when the patient appears to enjoy in other respects perfect health. Sometimes, however, their evolution is apparently induced by some excess, by mental emotion, or by some other disease, such as a fit of intermittent fever. Their eruption is also sometimes, though rarely, accompanied by general constitutional disorder.

With regard to the connexion of peculiar forms of secondary eruption with each individual variety of primary affection, experience has fully taught us that the same identical form of syphilitic eruption may appear after gonorrhœa as after chancre and buboes, Mr. Carmichael is of opinion that the exanthematous and papular form are the species which most commonly succeed gonorrhœa, in the event of the disease being followed by constitutional symptoms.

Diagnosis. Although the external features of syphilitic eruptions are very striking, yet it most frequently happens that other eruptions are mistaken for them, and that, on the other hand, venereal diseases of the skin are often considered as eruptions of an ordinary nature, and treated accordingly.

Syphilitic roseola differs from simple roseola in its more tardy progress, and in the coppery tint of the patches, which deepens as the disease advances, whilst in simple roseola the vivid hue becomes gradually more faint. Syphilitic blotches (*maculæ syphiliticæ*) are circular, circumscribed, isolated, of a dark dingy red coppery colour, and free from itching, and constant desquamation. The epelides or maculæ hepaticæ form large irregular continuous patches, are very itchy, of a yellowish colour, and generally appear on the abdomen and anterior aspect of the thorax.

In the *vesicular* eruption, the coppery areola of the base of the vesicles, their slow progress, and other existing symptoms of syphilis, will sufficiently distinguish them.

The *pustular* syphilitic eruption differs from the pustules of acne by the livid coppery red colour of their base: between these the skin is not red, shining, unctuous, and studded with small black spots; it is, on the contrary, dry, sallow, and shrunk. The cicatrices of the syphilitic pustules are round, but those of acne are oblong. The red purple colour of the base of ecthyma differs greatly from the dusky copper red of the venereal pustules. The scales of these latter are thicker, more adhering, and sometimes almost black. The ulcerations which succeed them are deep and sharp cut.

The *papular* syphilitic eruptions differ from the lichen simplex in the copper hue of the areola, and in the diffusion of the papulæ over the whole surface, forming here and there broad copper-coloured patches, studded with innumerable small conical papulæ of a lighter shade.

The *squamous* eruptions of syphilitic origin differ in the copper colour of the patches, which are smooth, not rough as in psoriasis; the scales are not thick and broad, but thin, dry, and flimsy. In the ordinary psoriasis guttata, around the base of the red slightly elevated patch a rim of broken cuticle is always to be seen, which encircles it with a white line.

The *tubercular* syphilitic eruptions, when they form annular patches (which we consider to be lepra syphilitica, and therefore a squamous disease), are known by their colour, and by the circle being formed, not by a continuous patch, but by many small, smooth, shining indurations, close together, though distinctly separated, and covered by thin hard scales, always smaller than the induration on which they are placed. The ulcers of the linear serpigenous syphilitic eruption will always be sufficient to distinguish it from the psoriasis gyrata; and the thick, flat, round pustules often found on the scrotum, and considered to be psoriasis guttata, widely differ from this latter disease by the absence of scales, and the ulceration of their surface. The large dark red indurations which occur on the back, mixed with small cicatrices, are often considered as syphilitic. It must, however, be observed that the indurations are secondary, and succeed to pustules, that they tend to decline, and moreover their colour is red, not coppery. The cicatrices that succeed to acne are small, oblong and pale; unlike the rough, irregular, puckered cicatrices of syphilitic pustules.

When tubercles precede lupus, they are red, soft, and small, and the surrounding skin has an œdematous appearance. Those of syphilitic character are of a dusky red copper colour, hard, smooth, and shining. The first usually appear in young scrofulous subjects, while the others occur in persons of ma-

turer years, and are almost always accompanied by other symptoms of constitutional syphilis.

The scales which often follow pustular syphilitic eruptions have been sometimes mistaken for those of impetigo; but these latter are yellowish and easily detached; whilst the former are of a dark and almost black green, much furrowed on their surface, hard, and always deeply and firmly seated in the cutis.

The ulcers which succeed to pustular syphilitic eruptions differ from those which follow lupus by their depth, and their hardened sharp cut edges, surrounded by a coppery areola. Those of lupus are more superficial; the ulcerated surfaces are even occasionally somewhat hypertrophied, with soft livid edges, the surrounding skin being rather soft and œdematous. It is rather more difficult to distinguish these tubercles when seated upon the nose, but slight attention will always prevent a mistake. The peculiar copper colour, the hardness, and the existing constitutional symptoms of syphilis indicate the venereal pustule; whilst the dusky red, soft tubercle of lupus, with the general constitution of the subject, will show its real character.

Treatment. On entering on this most important part of the history of syphilitic eruptions, we may observe that they are not all equally untractable. The exanthematous and papular forms give way the most readily; the pustular form commonly yields without much difficulty to appropriate treatment; the squamous variety is more obstinate, but the tubercular and larger pustular varieties are by far the most obstinate.

The antiphlogistic regimen, mild diluents, rest, emollients, and the due regulation of the alvine discharges, have been supposed sufficient in the great majority of cases to effect the cure of syphilitic eruptions. Repeated observation, and the unbounded experience of M. Biett, have fully convinced us that these measures are often useful, and sometimes absolutely necessary as auxiliaries; that sometimes, though rarely, syphilitic eruptions may be thus cured, though the process is very tedious; but that they are generally insufficient, and only of marked utility, in the cases of exanthematous and acute papular eruptions, which are generally evanescent, accompanying primary symptoms and disappearing with them.

Mercury, in its various forms, we consider the most useful remedy in syphilitic eruptions; but its administration must not be indiscriminately adopted. Thus, it ought never to be employed during their acute stage, that is, the primary stage of the eruption. The antiphlogistic regimen may be employed at this period to pave the way for more efficient remedies. The most efficacious form in which mercury can be administered in these cases is the protoioduret, first introduced by M. Biett, and of the good effects of which too much cannot be said. It is employed internally and also externally, by inunction on the diseased surfaces. It should be given so as not to cause salivation, and should it appear in the slightest degree, its employment must be suspended.

The muriate or deuto-chloruret of mercury may be also of service, in doses proportioned to the symptoms and state of the patient. The efficacy of these means may be promoted by some gentle sudorific drink. Calomel is also a valuable preparation in these cases; but in whatever form mercury is employed, small doses of opium should be added, and the effects of the remedy duly watched. As to the time it should be continued it is impossible to lay down precise rules; the doses must be lessened as the eruption decreases, and exhibited in smaller doses for a short time afterwards.

Sudorifics are sometimes alone sufficient for the cure of syphilitic eruptions, but generally they are only to be regarded as auxiliaries. Guiac and sarsaparilla are the best. The decoction of feltz has proved of service when mercury has either failed, or had been already freely employed.

Should mercury and the sudorifics, however carefully administered, fail in producing the desired effect, various means are to be had recourse to; such as the muriate of gold, the subcarbonate of ammonia, the mineral acids, opium, Arnoult's or Zittman's decoction. The muriate of gold, at least in

syphilitic eruptions, is far from being as efficient as has been reported. It is employed in doses of one tenth part o a grain rubbed on the tongue twice a day.

The subcarbonate of ammonia we have known to succeed when the mercurials have failed: the dose is a drachm daily dissolved in a pint of barley-water, which may be gradually increased to two or three drachms. The remedy is certainly disagreeable, and often brings on nausea at first; but with a little patience th stomach is soon brought to bear it.

The mineral acids, sulphuric or nitrous, we have seen produce the best effects in Biett's practice, not only in the slight exanthematous forms of the disease, but also in several very obstinate unyielding cases of the pustular species. The dose is from twelve to twenty-four drops in a pint of barley-water sweetened.

Arnoult's decoction and Zittman's decoction we have seen succeed in very desperate cases. Should violent diarrhœa occur, the dose must be lessened the remedy suspended for a time; but generally these remedies do not disagree with the bowels.

Opium is a remedy, the good effects of which have been long known, and we have in several cases seen it effect a cure where the syphilitic eruptions and other symptoms had resisted all other measures. It is to be given at first in half-grain doses, gradually increased every three or four days: it may be carried as far as four grains or even more, daily, but it requires to be watched.

The external remedies are not to be forgotten. Slight inunctions with the ointment of the proto-ioduret of mercury on the patches by the patient himself; or when the tubercles are obstinate with the ointment of ioduret of sulphur, in the proportion of twenty or thirty grains in an ounce of axungia. The ointment of the deuto-ioduret may also be very useful, but requires more attention and care in its management.

When ulcerations occur, the same preparations are to be employed as dressing, in varying doses according to the state of the surfaces. These ulcers sometimes require to be slightly cauterised with the nitrate of mercury. The pain is often mitigated by the hydrocyanic cerate applied on lint.

Baths are also frequently very serviceable—the alkaline bath in cases of pustular syphilitic eruption; the vapour bath in obstinate squamous disease; the vapour douche poured on the unyielding tubercular affection. The local cinnabar fume bath is the best remedy in the flat tubercles, which so frequently occur on the scrotum and around the anus.

With regard to the baths of corrosive sublimate, experience has not yet sufficiently proved their efficacy. The different washes proposed by writers, that of the sulphate of zinc or of copper, the solution of corrosive sublimate, and even the black wash, are generally of very little use in these syphilitic eruptions.

When ulcerations appear at the same time in the throat, they must be slightly touched two or three times a day with the liniment of the proto-ioduret of mercury (twenty grains in half an ounce of honey).

Iritis must be treated by local and general bloodletting, and the exhibition of mercury.

When the eruptions appear on children at the breast, the nurse or mother ought to undergo the treatment. Inunctions made alternately on the legs and thighs with the camphorated mercurial ointment, are preferable to the exhibition of the corrosive sublimate. Should the child or nurse prove too weak to undergo this treatment, the mercurial inunction may be made on a she-goat, with the milk of which the child is to be nourished.

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